AUTOMOTIVE INDUSTRIES

AUTOMOTIVE and AVIATION MANUFACTURING
ENGINEERING • PRODUCTION • MANAGEMENT

OCTOBER 1, 1958

In This Issue

Automation Techniques at Ford's Lima Plant
Details of the Saginaw Power Steering Gear
Assembly Facilities for Chrysler Imperial
Road Test Simulator System at Perfect Circle
1959 Rambler Six and V-8, Ambassador and American; Cadillac and Oldsmobile

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A CHILTON PUBLICATION

NEW from Standard Oil

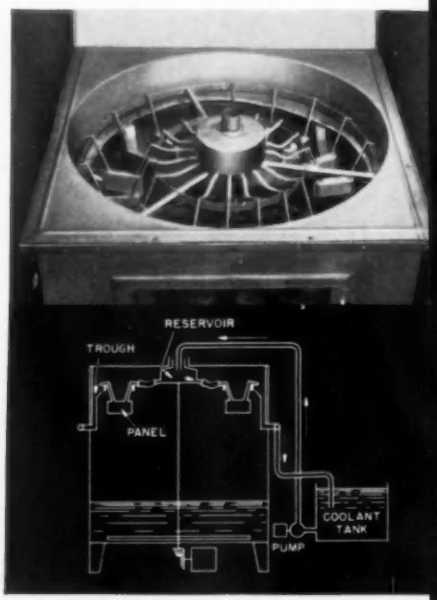
THE MAGIC BOX

Corrosion steals $5.5 billion from industry annually. Standard Oil is in the forefront of the fight to control this loss. Standard's research scientists have developed a new method for measuring the effectiveness of rust preventives. This new test takes less than one-twentieth of the time of previous tests—and is about three times as precise.

Using a controlled humidity cabinet for testing corrosion, these Standard research men installed a system for cooling metal test panels (previously treated with rust preventive) so that their surface temperatures are lower than the temperature in the cabinet. Temperatures of panel surfaces and of cabinet atmosphere are held accurately. Controlling the temperature of the panels controls the rate at which water condenses on them. This in turn (for the first time) permits accurate control of the amount of condensation on the panels. Rust preventives are more speedily and precisely tested. Science, as a result of this work, has a new tool with which to test corrosion.

This is the research pay-out industry receives from Standard Oil. This is the something extra that backs up the Standard industrial lubrication specialist who calls on you. This is the something extra found in the products he sells.

To know more about how Standard Oil industrial lubrication specialists—and Standard's research program—can help you, call the Standard Oil office nearest you in any of the 15 Midwest and Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

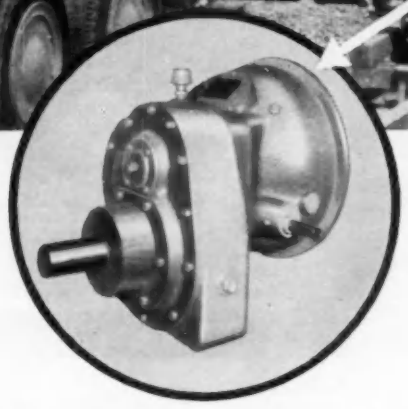


Top view and cross section of Accelerated Condensation Corrosion Test cabinet.

Edgar A. Dieman, Standard Oil scientist, inventor of new Rust Preventive System, inspects metal panel that has undergone test in the humidity cabinet.

You expect more from STANDARD and get it!

Circle 101 on Inquiry Card for mor



HEAVY-DUTY REDUCTION UNIT BY COTTA

Here's another example of how trend-setters in heavy-duty diesel power rely on famous Cotta gearing, both for rugged dependability and fast user acceptance. The new P & H Diesel-Electric Power Package by Harnischfeger drives big portable rock crushers through a Cotta 1.46 to 1 Heavy-Duty Reduction Unit and powers electric motors driving the conveyor system at the same time. Facilitating the 205 hp unit's high-power, high-torque performance, the efficient Cotta gear reducer also contributes to a remarkably low-weight design — only 4850 lb complete — and helps keep maintenance at a minimum under dusty operating conditions. Custom-designed or standard Cotta reduction units can help you turn diesel ideas into important new power units for your industry.

Solve your heavy-duty power transmission problems in the 150 to 2000 lb torque range with a Cotta "engineered-to-order" transmission or gear reducer. Cotta can produce in any quantity beginning with one! Famous for low maintenance on tough applications the world over — pumps, rail cars, cranes, winches, drilling rigs, trucks and other mobile equipment. Call or write today — discuss it with the Cotta *specialists* in heavy-duty power transmission.

THIS INFORMATION WILL HELP YOU

Sent free on request — diagrams, capacity tables, dimensions, and complete specifications. State your problem — COTTA engineers will help you select the right unit for best performance. Write today.

COTTA TRANSMISSION CO., ROCKFORD, ILLINOIS

An Assurance of Dependable Service

COTTA

HEAVY-DUTY REDUCTION UNITS

"Engineered-to-order"

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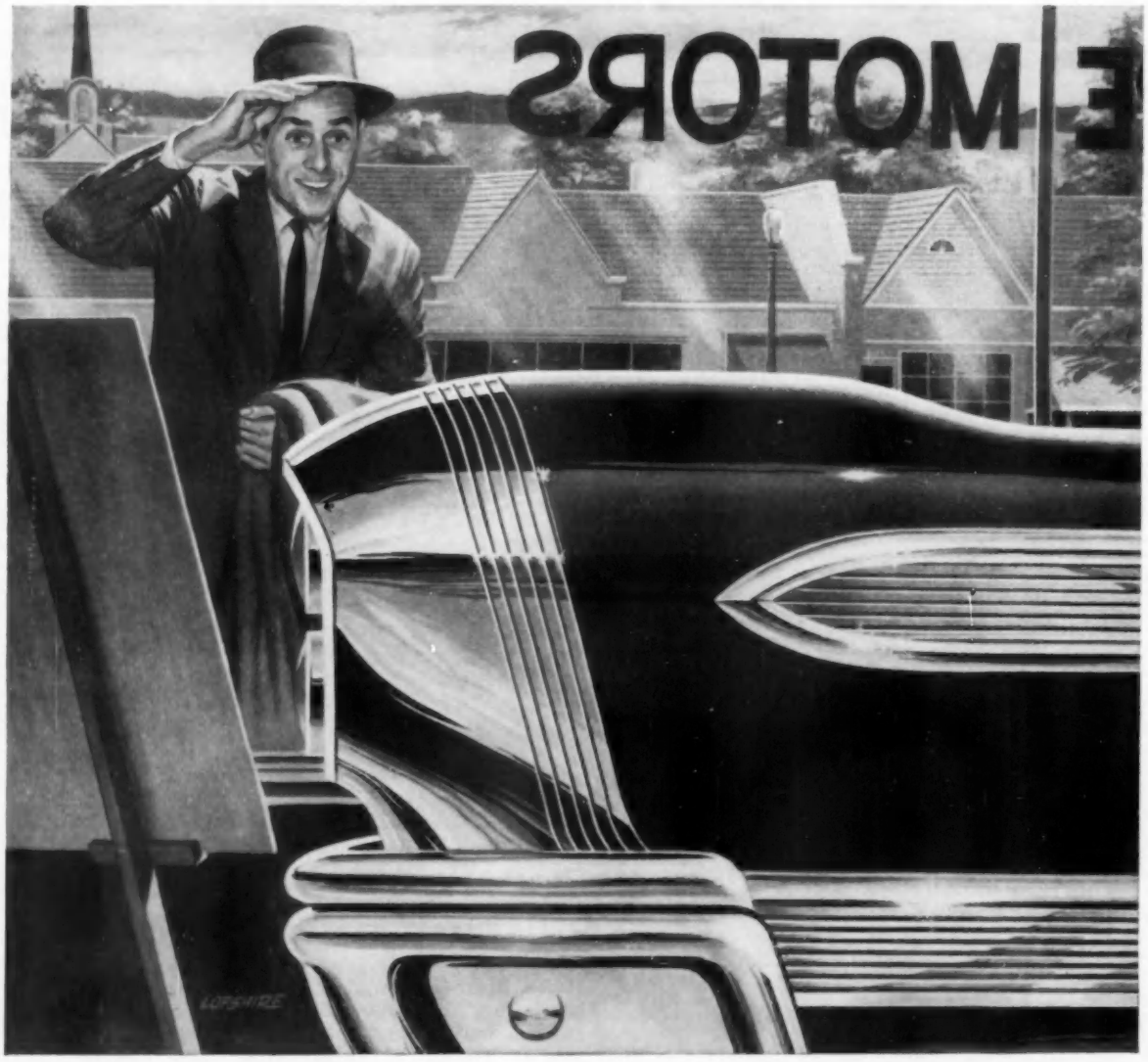

Put the gleam in his eye with heavy Nickel plating under chrome

Chrome can really snap-up a new car . . . can really give it a "come-buy-me" look.

And when chrome has tough, durable Nickel plating underneath, its sparkling beauty is *lasting* beauty.

That's because heavy Nickel plating does three important things:

(1) It makes a smooth, white-metal foundation for a brilliant chrome finish.

(2) It protects the steel and other base metals from rust and corrosion.

(3) It backs up the chrome and keeps it from cracking under impact.

With these three advantages, your customers can keep their car trim looking showroom-bright, for years and years, with just ordinary washing.

Put the gleam in your customer's eye . . . keep it there . . . keep him sold . . . put heavy Nickel plating underneath your new car chrome.

The International Nickel Company, Inc.
67 Wall Street New York 5, N. Y.

Inco Nickel

Makes metals perform better longer

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Nickel plating...under chrome...over steel: That's how a good bumper finish is built up. Chrome gives you shining beauty. Nickel plating makes the beauty last. Steel is for strength and safety.

AUTOMOTIVE INDUSTRIES

A CHILTON MAGAZINE — PUBLISHED SEMI-MONTHLY

OCTOBER 1, 1958 — VOL. 119, NO. 7

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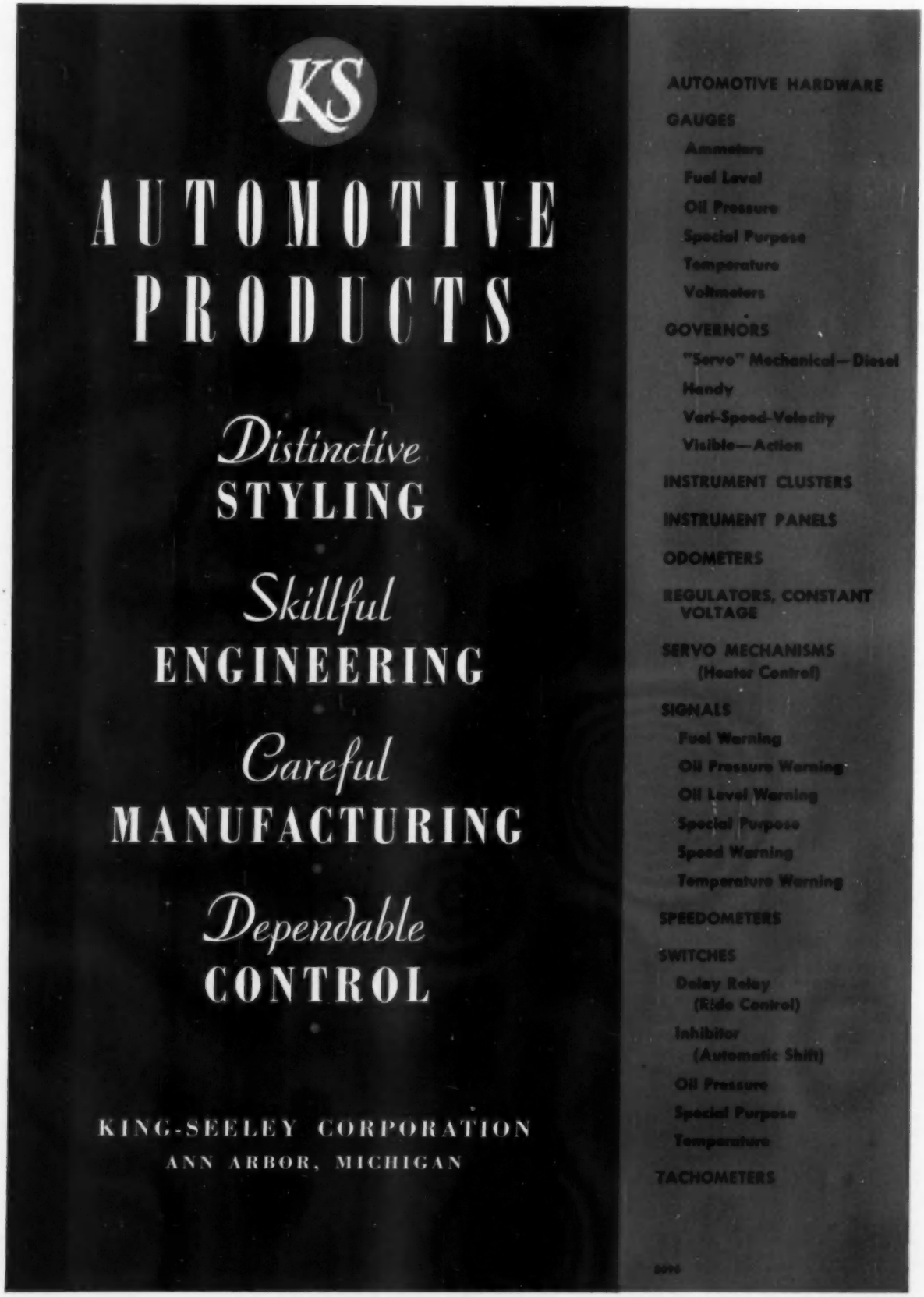

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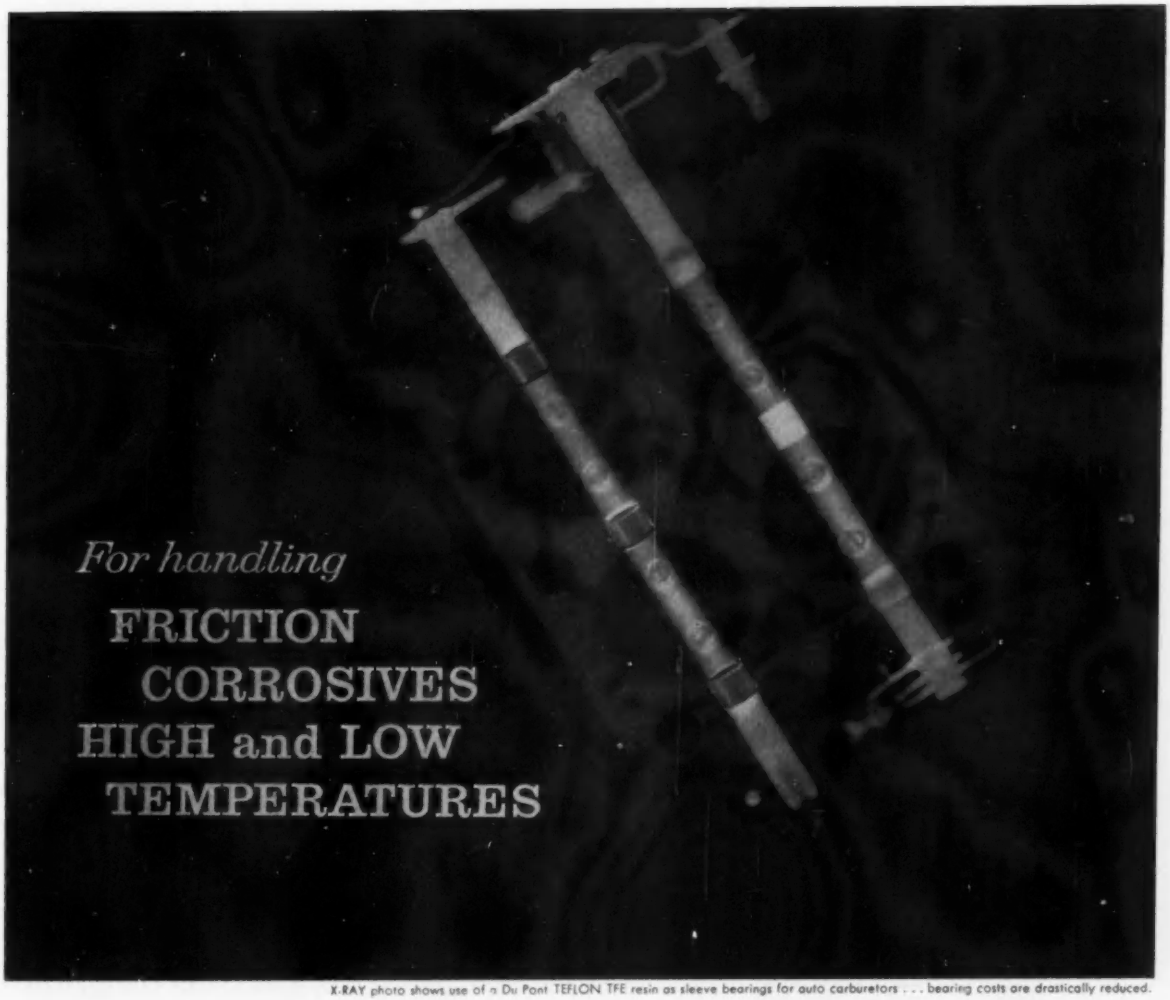

X-RAY photo shows use of n Du Pont TEFLON TFE resin as sleeve bearings for auto carburetors . . . bearing costs are drastically reduced.

Here's why bearings of TFE-fluorocarbon resins may be your solution

Bearings of TFE-fluorocarbon resins are "self-lubricating". Even the best lubricants used on metal rarely provide a coefficient of friction as low as 0.04, which is readily attained with TFE resins at low velocities. Moreover, TFE resins are among the most chemically inert materials known to science. They are rated for continuous use at temperatures from −450°F. to 500°F.

THAT'S WHY: You can use *dry bearings* of TFE resins where lubrication is difficult or even impossible. As in the carburetor pictured above, they perform unharmed in contact with gasoline, oil, grease, and automotive chemicals. These bearings eliminate slip-stick motion and remain unchanged in cold that turns alcohol to slush.

In use, the bearings coat revolving shafts with a molecular film of the TFE resin. Thus, any friction is that of the resin against itself. Bearings of TFE resins can be tailored for high loads, high velocities or high wear-resistance by the use of reinforced constructions.

Discover how you can improve automotive products and production with bearings of Du Pont TFE-fluorocarbon resins. For product and design information see your local supplier. Look for him under "Plastics—Du Pont" in the Yellow Pages or write to: **E. I. du Pont de Nemours & Co. (Inc.), Room AI2524, Nemours Building, Wilmington 98, Delaware.**

In Canada: Du Pont Company of Canada (1956) Limited, P.O. Box 660, Montreal, Quebec.

• A heavy duty TFE resin construction replaced a super-alloy in rod-ends of aircraft controls. Lined sockets withstand operating loads as high as 60,000 psi without lubrication. Break-away and running friction are less than half that of a greased bearing.

DU PONT
REG. U.S. PAT. OFF.

TEFLON®
TFE-FLUOROCARBON RESINS

TEFLON is Du Pont's registered trademark for its fluorocarbon resins, including the TFE (tetrafluoroethylene) resins discussed herein.

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

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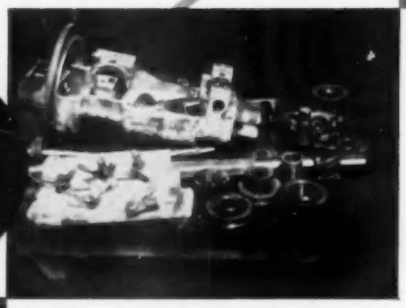
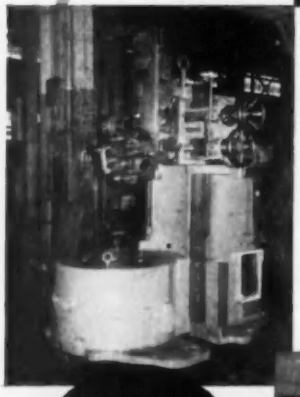
BULLARD

rebuilds from the ground up

Yes — we disassemble each machine right down to the bed.



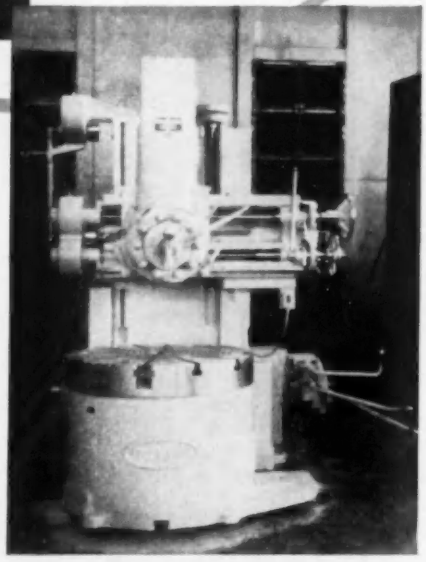
Each individual piece is cleaned and inspected



"and if found serviceable is re-used, if not, it is replaced.

What does this mean to You?

1. Thorough workmanship by the same skilled craftsmen that built the machine.
2. Only "original equipment" precision replacement parts, where necessary.
3. Fast service.
4. One year guarantee on all parts replaced — including labor.



If you're planning to rebuild any of your Bullard machines contact your nearest Bullard Sales Office or Distributor for a quotation or write

BULLARD

THE BULLARD COMPANY BRIDGEPORT 9, CONNECTICUT

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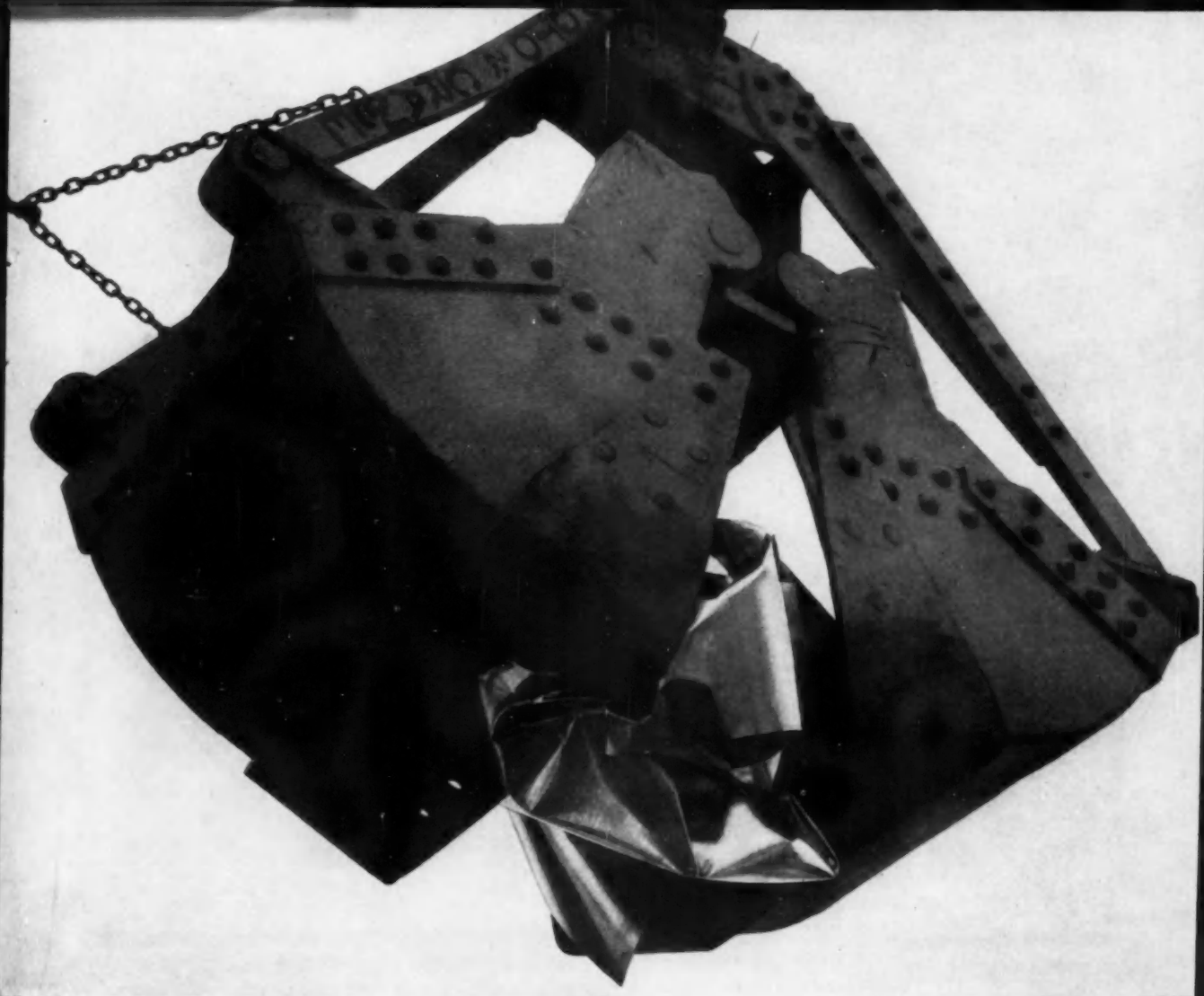

SQUEEZE PLAY FAILS TO SCORE AGAINST WEIRKOTE®

Crun-n-n-ch!

For brutal, iron-jawed pressure, a steam shovel has few equals. Here, in this crushing grip, Weirkote's zinc coating undergoes a murderous test.

Yet at every crease, at every tortured angle of this crumpled mass, the zinc remains an integral part of the steel. There is not one sign of flaking anywhere!

No wonder strenuous forming operations such as lock seaming are child's play, for Weirkote can be worked to the very limits of the steel itself!

No wonder parts fabricated from it require no painting, plating or redipping to guard against corrosion. Weirkote parts can be stamped, drawn or spun well in advance of use, and stored without danger of rust.

And NOW, Weirkote is treated to inhibit wet storage (white oxide) stain.

Why not find out what Weirkote's benefits can mean to you?

Free Weirkote Booklet! Send for all the facts on Weirkote. Write Weirton Steel Company, Dept. T-6, Weirton, West Virginia

WEIRTON STEEL COMPANY

WEIRTON, WEST VIRGINIA

a division of

NATIONAL STEEL CORPORATION

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Why make your own?

Save labor, get better performance with Honeywell thermocouple elements

CONSIDER the time and expense of making your own thermocouple elements. More important, compare the quality of Honeywell elements with ones you make yourself. You'll see why it'll pay to have Honeywell supply your needs.

For one thing, Honeywell thermocouple elements feature butt-welded measuring junctions. This gives you a stronger, more uniform junction than conventional welds, and provides best possible speed of response. All elements are calibrated to meet or exceed ISA standards.

Delivery is prompt. Honeywell can supply from stock—immediately—all of the most common gauge sizes and lengths; others within two weeks.

Get complete details from the Honeywell Supplies Man at your Honeywell branch. Call him today . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pa.

Honeywell

First in Control

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Waldes Truarc Prong-Lock Ring Eliminates Springs, Washers, Takes Up End-Play

WALDES TRUARC
SERIES 5139 RETAINING RING*

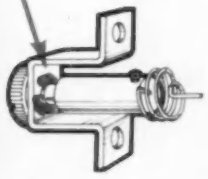
application: external for shafts
range: 3/32" through 7/16"

*U. S. Pat. No. 2,755,698

After radial application, the Waldes Truarc Prong-Lock retaining ring locks and holds securely in its groove by means of two prongs. Because of its resistance to radial displacement, the ring may be used as a shoulder for rotating parts. Thrust-load capacity ranges from 80 to 700 lbs. for sizes from 3/32" to 7/16". Bowed construction provides end-play take-up, often eliminating springs, washers and accessory devices.

Rings replace cotter pins, spring-washers; save $68.00/M

Mason-Neilan Division of Worthington Corp., Norwood, Mass., uses two Waldes Truarc Series 5139 Prong-Lock rings on its pressure controller to secure pivots through which a right angle micrometer adjustment screw passes. Each ring replaces hairpin-type cotter pin and bowed washer. . . provides necessary tension to prevent adjustment screw from shifting. Manufacturing costs were reduced by $68 per 1,000 units.



Ring replaces locknut, eases control calibration

On a differential pressure control mechanism, Taylor Instrument Companies, Rochester, N. Y., replaced a locknut and eliminated a costly threading operation with a series 5139 Prong-Lock ring. Also eliminated is the loosening and tightening of the locknut before and after each calibration setting. Spring action of the ring securely holds the calibration setting.

Whatever you make, there's a Waldes Truarc Ring designed to save you material, machining and labor costs, and to improve the functioning of your product.

In Truarc, you get:

Statistically Controlled Quality from engineering and raw materials to the finished product. Every step in manufacture watched and checked in Waldes' own modern plant.

Complete Selection: 36 functionally different types. As many as 97 standard sizes within a ring type. 5 metal specifications and 14 different finishes. All types available quickly from leading OEM distributors in 90 stocking points throughout the U. S. and Canada.

Field Engineering Service: More than 30 engineering-minded factory representatives and 700 field men are at your call.

Design and Engineering Service not only helps you select the proper type of ring for your purpose, but also helps you use it most efficiently. Send us your blueprints today . . . let our Truarc engineers help you solve design, assembly and production problems . . . without obligation.

WALDES
TRUARC®
RETAINING RINGS

WALDES KOHINOOR, INC., LONG ISLAND CITY 1, N. Y.

Waldes Kohinoor, Inc., Long Island City 1, N. Y.

Please send me additional information and engineering data for the Truarc Prong-Lock Ring, Series 5139.

Name_____

Title_____

Company_____

Business Address_____

City_____ Zone____ State_____

AY-100

Consult the Yellow Pages of your Telephone Directory for name of Local Truarc Factory Representative and Authorized Distributor. Look under "Retaining Rings" or "Rings, Retaining."

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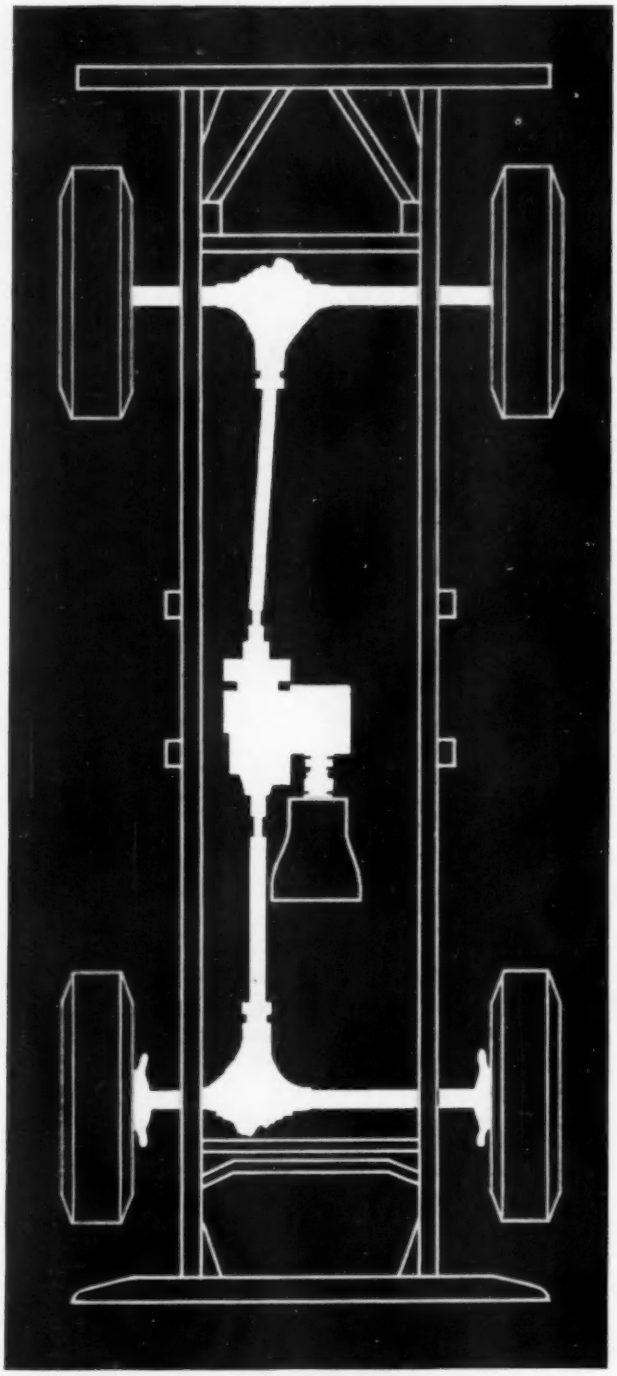
A DANA EXCLUSIVE...

Complete four-wheel drive assemblies



Only Dana has a complete . . . and power-matched . . . four-wheel drive assembly for almost any lightweight vehicle you produce. Just list your requirements and Dana will furnish the complete assembly, including front and rear driving axles, transfer case, propeller shafts and universal joints. And, since every component is designed to work together, you know the Spicer assembly will be power-matched to your specifications.

Axle length is never a problem because the Spicer design has the axle tubes pressed into the carrier housing. Thus you have a choice of hundreds of variations in axle length, wheel treads and spring seat arrangements plus either Cardan or constant-velocity wheel joints, as you prefer.

Make just one call . . . to the Dana engineer . . . when you're laying out a four-wheel drive design.

In the shortest possible time, he will coordinate the design of a complete four-wheel drive . . . and one that's power-matched throughout.

DANA CORPORATION • **Toledo 1, Ohio**

DANA PRODUCTS Serve Many Fields:

AUTOMOTIVE: Transmissions, Universal Joints, Propeller Shafts, Axles, Powr-Lok Differentials, Torque Converters, Gear Boxes, Power Take-Offs, Power Take-Off Joints, Clutches, Frames, Forgings, Stampings.

INDUSTRIAL VEHICLES AND EQUIPMENT: Transmissions, Universal Joints, Propeller Shafts, Axles, Gear Boxes, Clutches, Forgings, Stampings.

AVIATION: Universal Joints, Propeller Shafts, Axles, Gears, Forgings, Stampings.

RAILROAD: Transmissions, Universal Joints, Propeller Shafts, Generator Drives, Rail Car Drives, Pressed Steel Parts, Traction Motor Drives, Forgings, Stampings.

AGRICULTURE: Universal Joints, Propeller Shafts, Axles, Power Take-Offs, Power Take-Off Joints, Clutches, Forgings, Stampings.

MARINE: Universal Joints, Propeller Shafts, Gear Boxes, Forgings, Stampings.

DANA Spicer

Many of these products manufactured in Canada by Hayes Steel Products Limited, Merritton, Ontario.

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Classroom "automobile" trains safer drivers

As the moving picture takes students through a variety of traffic situations, their reactions are automatically recorded on a card for evaluation by the instructor (standing, at rear of classroom).

These students are learning safe-driving habits, judgment, and skill by experiencing true-to-life driving conditions—without leaving the classroom. Each student drives his own Drivotrainer, a stationary "auto" developed by Aetna Casualty and Surety Company, Hartford, Conn., and built largely of Bethlehem steel sheets by Automatic Voting Machine Corporation, Jamestown, N.Y.

The moving picture takes the student through a wide range of actual traffic situations. Using the Drivotrainer's pedals and other controls just like those on real cars, the trainee meets each situation as it arises. His performance is automatically recorded on a score card for the instructor's evaluation. Now teachers can train more, better, and safer drivers at lower cost per pupil.

In any sheet metal operation, you can depend on Bethlehem sheets for accuracy in gage, uniformity in surface, and quality. If you use sheets perhaps we can help you turn a problem into a profit. Just call our nearest office.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

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For greater selling impact·

MOTO-MOWER

FORMS SEAT and SHROUD

from

CYCOLAC® SHEET

HIGH-IMPACT THERMOPLASTIC RESIN

HERE'S WHAT CYCOLAC SHEET MEANS TO MOTO-MOWER

The Moto-Mower Division of Detroit Harvester Co. designed a colorful, comfort-molded seat and a light-weight, long-lasting shroud for its Moto-Mower Power Lawn Mower. Replacing costly, heavier metal in these particular applications, Cycolac was greatly responsible for the development of a lighter-in-weight power lawn mower . . . a more economical-to-manufacture, easier-to-sell unit, designed to take severe use and abuse in dependable stride.

Cycolac Sheet Extruded and Formed by:
Panelyte Division, St. Regis Paper Company,
Richmond, Indiana

THIS IS CYCOLAC... AND WHAT IT CAN DO FOR YOU!

This family of single uniform resins is extremely tough and versatile; extrudes readily, in profiles and sheets; easily injection molded and post formed.

- Wide range of process properties
- Fast extrusion to accurate dimensions
- Nerve-free calendering to exact gauge
- Adjustable to all methods of sheet forming
- Readily injection molded in fast cycles

Write for technical literature today!

PACESETTER IN

Marbon CHEMICAL

SYNTHETIC RESINS

Division of BORG WARNER • Washington, W. Va.

also represented by:

WEST COAST: Harwick Standard Chemical Co., Los Angeles, Cal.
CANADA: Dillons Chemical Co. Ltd., Montreal & Toronto
EXPORT: British Anchor Chemical Corp., New York

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What Are Your Special Universal Joint Requirements?

Anything from a heavy duty close coupled double universal joint like the one pictured above to a small power take-off joint (shown below) is right down "Cleveland's" alley. Limited joint length and diameter can probably be met with standard "Cleveland" components—and at a substantial saving to you.

Look to "Cleveland" for propeller shaft and universal joint requirements. We've been suppliers to the automotive and allied industries since 1912.

Cleveland Steel Products Corporation
Automotive Division
16025 Brookpark Road · Cleveland 11, Ohio

Manufacturers of

CLEVELAND

Universal Joints · Propeller Shafts and Power Take-Off Joints

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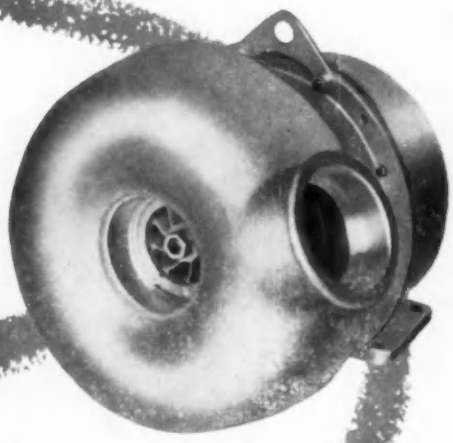
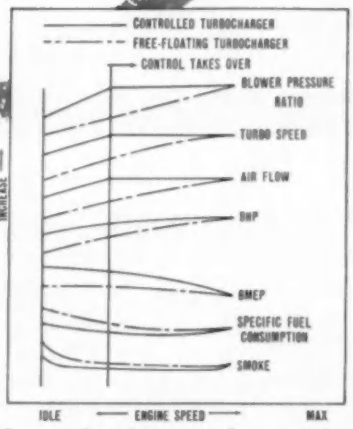
NOW!
CONTINUOUS, FULL POWER TURBOCHARGING



AiResearch control system keeps turbocharger output at ideal level



Improved performance characteristics of a typical turbocharged diesel engine equipped with the new AiResearch Turbocharger Control System.

Accurate control of turbocharger speed over its complete range regardless of changing load characteristics has been achieved with the new AiResearch Turbocharger Control System. This automatic control system delivers more air to the engine when needed and greatly increases torque rise, giving turbocharged diesel engines greater lugging ability when operating under heavy loads. By contrast, free-floating turbochargers operate at reduced RPM when the engine is working at below-maximum engine speed.

This improved air delivery system greatly increases the acceleration, for example, of turbocharged diesel trucks up steep grades. In a typical case, the round-trip time of a trucking company operating between Phoenix and Denver was cut from 48 hours to 42 hours. Over short hauls an off-the-road truck cut its 27-minute round-trip time to 18 minutes. Comparable gains are made for all types of turbocharged diesel equipment, stationary or mobile.

The two components of the new control system are a pressure ratio sensor and an exhaust by-pass valve. They control the speed of exhaust-driven turbochargers by modulating the amount of engine exhaust used. This eliminates overspeeding of the turboblower, and at the same time provides higher turboblower speed while lugging. Smoking is virtually eliminated under all conditions.

Your inquiries are invited.

THE GARRETT CORPORATION

AiResearch Industrial Division

9225 South Aviation Blvd., Los Angeles 45, California

DESIGNERS AND MANUFACTURERS OF TURBOCHARGERS AND SPECIALIZED INDUSTRIAL PRODUCTS

Circle 116 on Inquiry Card for more data

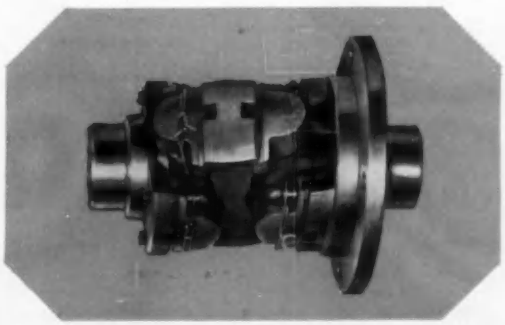
For RUGGED STAMINA

Manufacturers of the big diesel transports, that must stand up under hour-after-hour of gruelling service, have learned to rely upon MECHANICS Roller Bearing UNIVERSAL JOINTS to deliver hundreds of thousands of miles of trouble-free service. Because MECHANICS JOINTS drive through KEYS—instead of bolts—they stand up under punishment that shears off other types of fasteners. They are designed with less parts and connections for easy assembly and servicing—smooth running balance—maximum strength with less weight—and long, trouble-free, safe operation. Rugged stamina is just one of the advantages you get when you specify MECHANICS Roller Bearing UNIVERSAL JOINTS. Let MECHANICS engineers help you design this and other competitive sales features into your product's transmission train.

Specify MECHANICS *Roller Bearing* UNIVERSAL JOINTS

BW

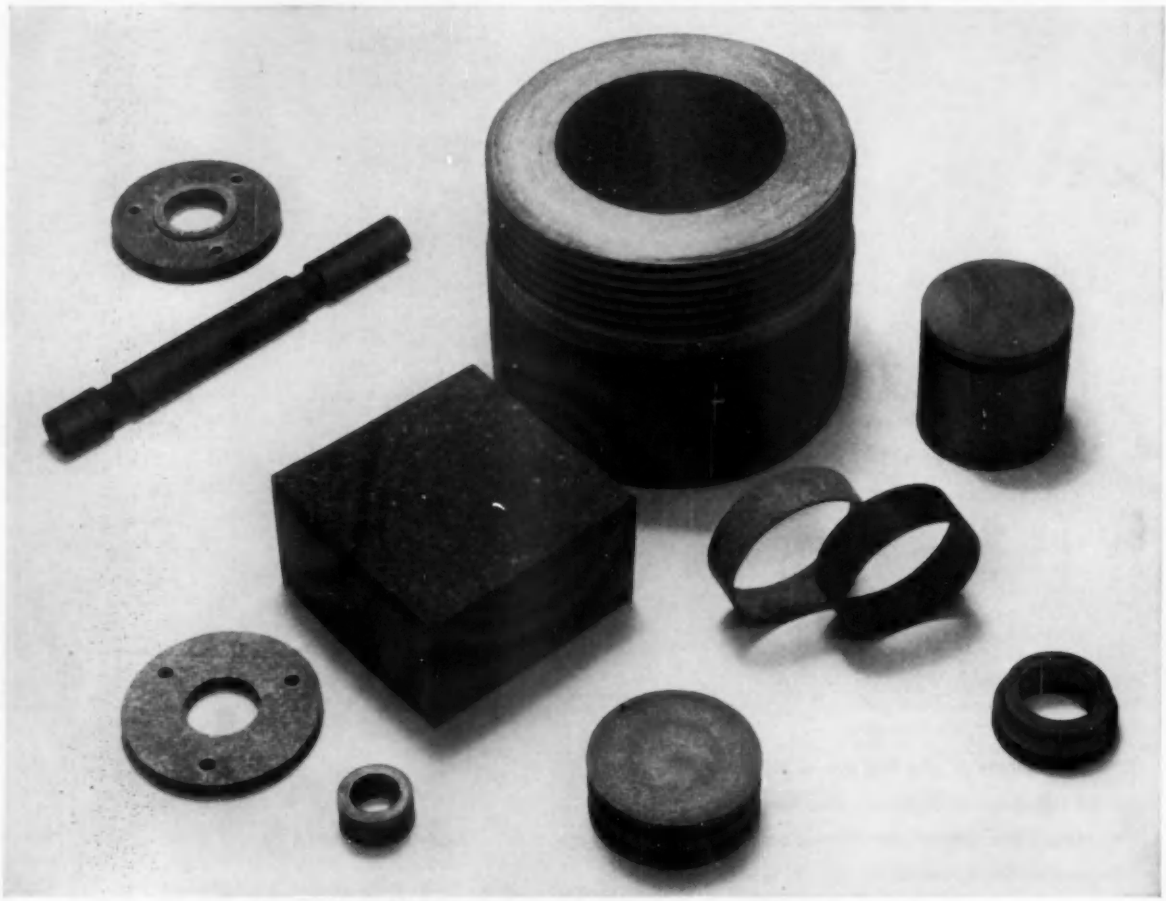
For Cars, Trucks, Tractors, Farm Implements, Road Machinery, Industrial Equipment, Aircraft



MECHANICS UNIVERSAL JOINT DIVISION
Borg-Warner • 2024 Harrison Ave., Rockford, Ill.
Export Sales: Borg-Warner International
36 So. Wabash, Chicago 3, Illinois

Circle 117 on Inquiry Card for more data

R/M PYROTEX REINFORCED PLASTIC PARTS RESIST HEAT TO 10,000°F



A few of many R/M Pyrotex parts are shown here. Pyrotex, a reinforced plastic, is molded, laminated or machined into precision parts for a wide variety of applications.

R/M Pyrotex parts may be the answer to your problem for low-cost structural parts capable of resisting temperatures as extreme as 10,000°F, while still meeting structural strength and thermal insulation requirements. Pyrotex has been proven outstandingly successful in industrial, automotive, aircraft, rocket and missile applications.

Some of the advantages of R/M Pyrotex parts: have high strength-to-weight ratios and good dimensional stability; take a smooth finish; can be mass produced to precision standards; are ideally suited for bushing, bearing, sealing, braking, and hundreds of other applications —all usually at substantial savings in production costs. Write today for complete data on R/M Pyrotex parts.

THE COMPLETE LINE OF R/M REINFORCED PLASTICS

If your design demands all of the following features, find out more about R/M Pyrotex parts

- Heat and flame resistance up to 10,000°F or more
- Chemical and water resistance
- Relatively isotropic
- High modulus of elasticity from low to high temperatures (6 x 10^6 psi)
- High strength from low to high temperatures (60,000 psi)
- Improved surface of end items
- Exceptionally good dimensional stability
- Little or no surface crazing
- Good insulation and thermal properties
- Low cost
- High strength-to-weight ratio

For further information, write for technical bulletin

R/M FIRST IN FRICTION

RAYBESTOS-MANHATTAN, INC.

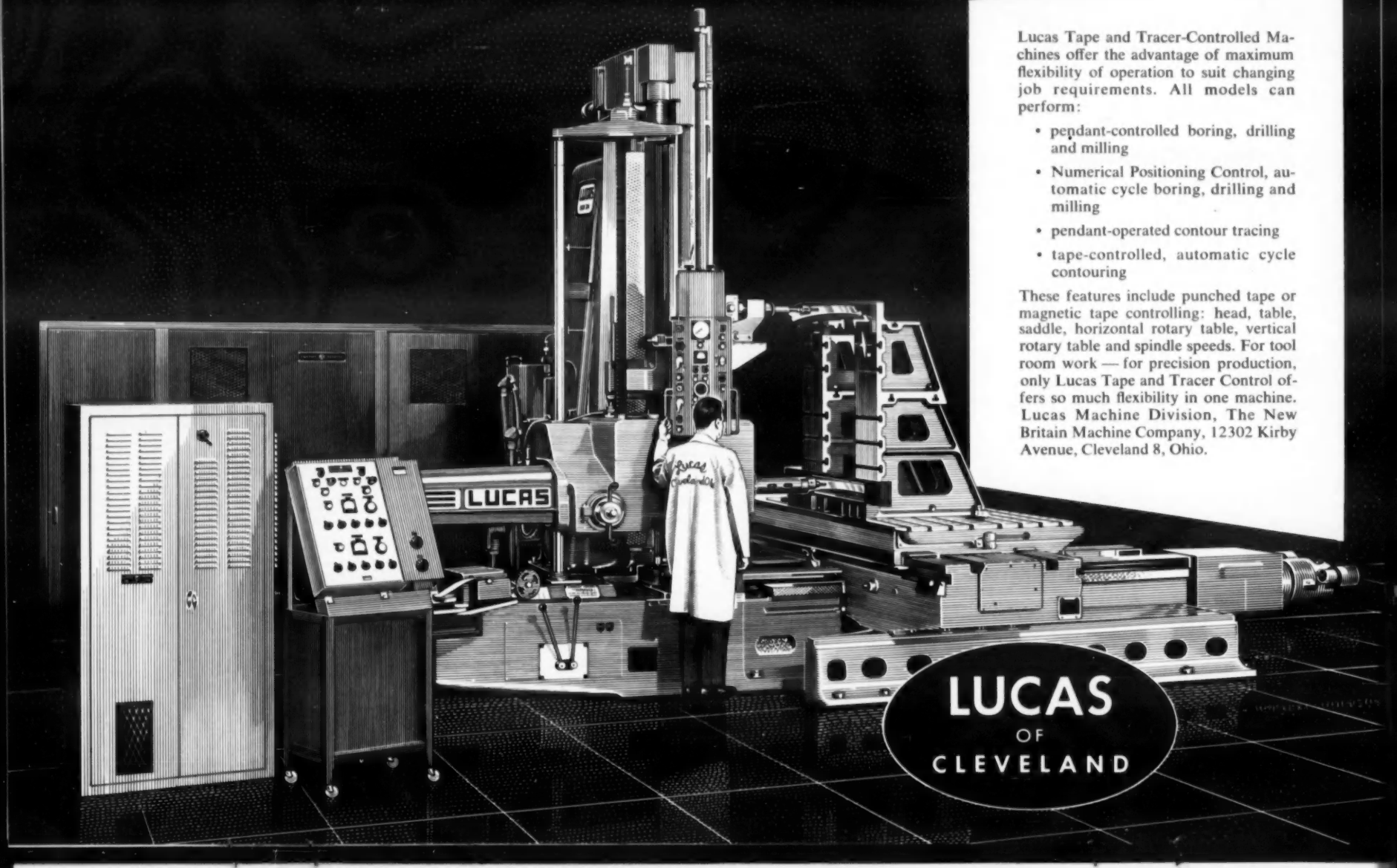
EQUIPMENT SALES DIVISION: Bridgeport, Conn. • Chicago 31 • Cleveland 16 • Detroit 2 • Los Angeles 58

RAYBESTOS-MANHATTAN, INC., Brake Linings • Brake Blocks • Clutch Facings • Sintered Metal Products Industrial Adhesives • Mechanical Packings • Asbestos Textiles • Industrial Rubber • Rubber Covered Equipment • Engineered Plastics • Abrasive and Diamond Wheels • Laundry Pads and Covers • Bowling Balls

Circle 118 on Inquiry Card for more data

A New Lucas Lathe
Fully-automatic Tape Control, Tracer Control or both. Infinitely variable speeds and feeds. Automatically-maintained, constant-cutting speeds on changing diameters. Console control from moving operator's platform. *Three* hardened and ground ways. Self-contained Motor Generator Set.
The Lucas Lathe — perfect for your large, lightweight, close tolerance, intricately-shaped problem jobs. Lucas Machine Division, The New Britain Machine Company, 12302 Kirby Avenue, Cleveland 8, Ohio.
LUCAS
OF
CLEVELAND

Lucas Tape and Tracer Control



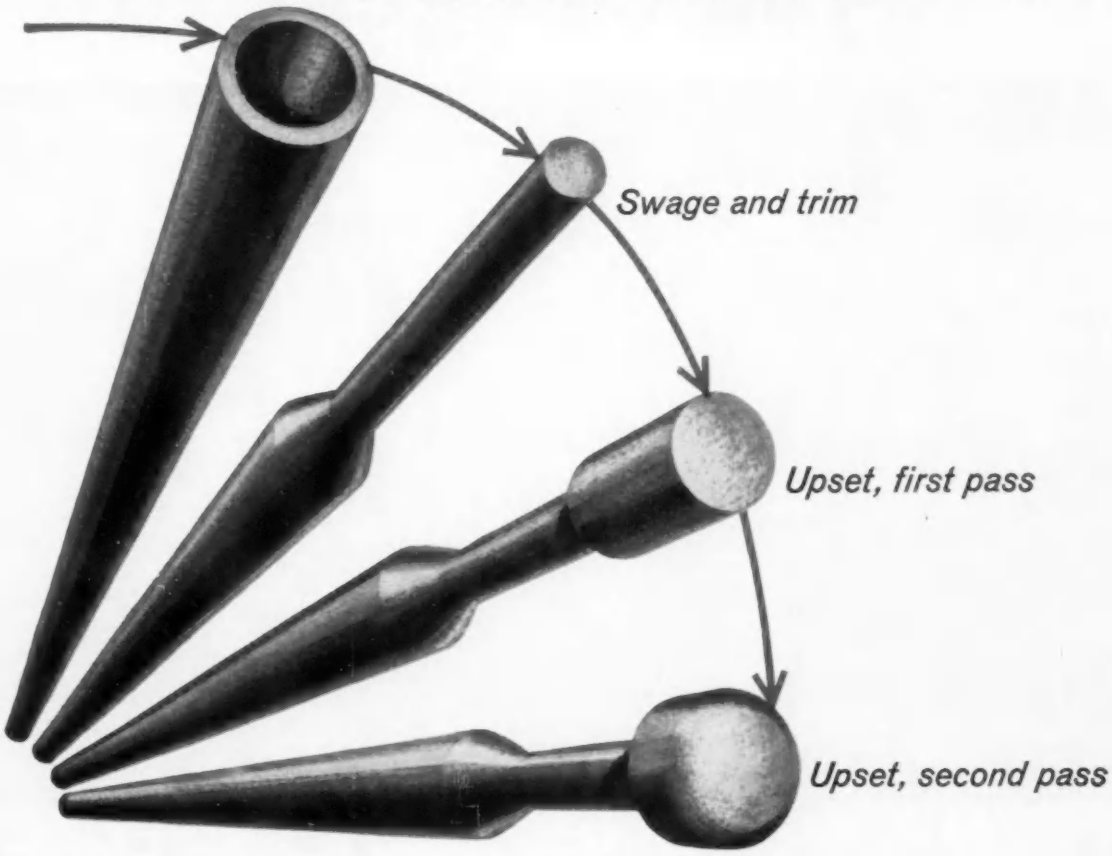
Lucas Tape and Tracer-Controlled Machines offer the advantage of maximum flexibility of operation to suit changing job requirements. All models can perform:

- pendant-controlled boring, drilling and milling
- Numerical Positioning Control, automatic cycle boring, drilling and milling
- pendant-operated contour tracing
- tape-controlled, automatic cycle contouring

These features include punched tape or magnetic tape controlling: head, table, saddle, horizontal rotary table, vertical rotary table and spindle speeds. For tool room work — for precision production, only Lucas Tape and Tracer Control offers so much flexibility in one machine. Lucas Machine Division, The New Britain Machine Company, 12302 Kirby Avenue, Cleveland 8, Ohio.

LUCAS
OF
CLEVELAND

Start with OSTUCO TUBING



and end up with a 34% *saving*

Here's a cost-cutting case history right in the Ohio Seamless mill. It proves we take our own medicine—*and like it.* You may, too.

Formerly, mandrels for rolling Ostuco Tubing on our Assel mill were made from two pieces. A shaped end, hogged out of solid bar stock, was welded to a long tube. Expensive to machine, weld and process.

We decided to *forge the mandrels entirely from Ostuco Seamless Steel Tubing.* In three steps—swage, upset and finish-form—we now produce better mandrels . . . ready for use without any machining whatsoever, *and save 34% over former processing methods.*

Chances are good that Ostuco Tubing is the right prescription for slashing your production costs, too. For expert advice, contact our nearest sales office or our plant at *Shelby, Ohio—Birthplace of the Seamless Steel Tube Industry in America.*

AA-7225

Visit us at Booth 771—Design Engineering Show Chicago—April 14-17

SALES OFFICES: Birmingham • Charlotte • Chicago (Oak Park) • Cleveland Dayton • Denver • Detroit (Ferndale) • Houston • Los Angeles (Lynwood) Moline • New York • North Kansas City • Philadelphia (Wynnewood) • Pittsburgh Richmond • Rochester • St. Louis • St. Paul • St. Petersburg • Salt Lake City Seattle • Tulsa • Wichita

CANADA: Railway & Power Engr. Corp., Ltd.

EXPORT: Copperweld Steel International Company 225 Broadway New York 7, New York

FIFTY YEARS
OSTUCO
OSTUCO TUBING
1908 1958

OHIO SEAMLESS TUBE DIVISION

of Copperweld Steel Company • SHELBY, OHIO

Seamless and Electric Resistance Welded Steel Tubing • Fabricating and Forging

Circle 119 on Inquiry Card for more data

you can get

This A.S.T.E. exhibit showed visitors how the winning combination that matches machine, work and cutters was found for companies like yours

the winning combination!

Write for this new book which tells more about this unusual Cutter Division service. It also describes and illustrates the standard and special inserted blade cutters being used by hundreds of companies to cut costs and improve performance.

The Key to Lower Cost Chips is found by matching the *right* cutter to the machine and to the work.

The Cutter Division of The Ingersoll Milling Machine Company offers you a unique source of assistance. The combination of *your own* knowledge of conditions in *your* shop and our broad experience in working with so many others assures reduced costs and better cutting performance for *you*.

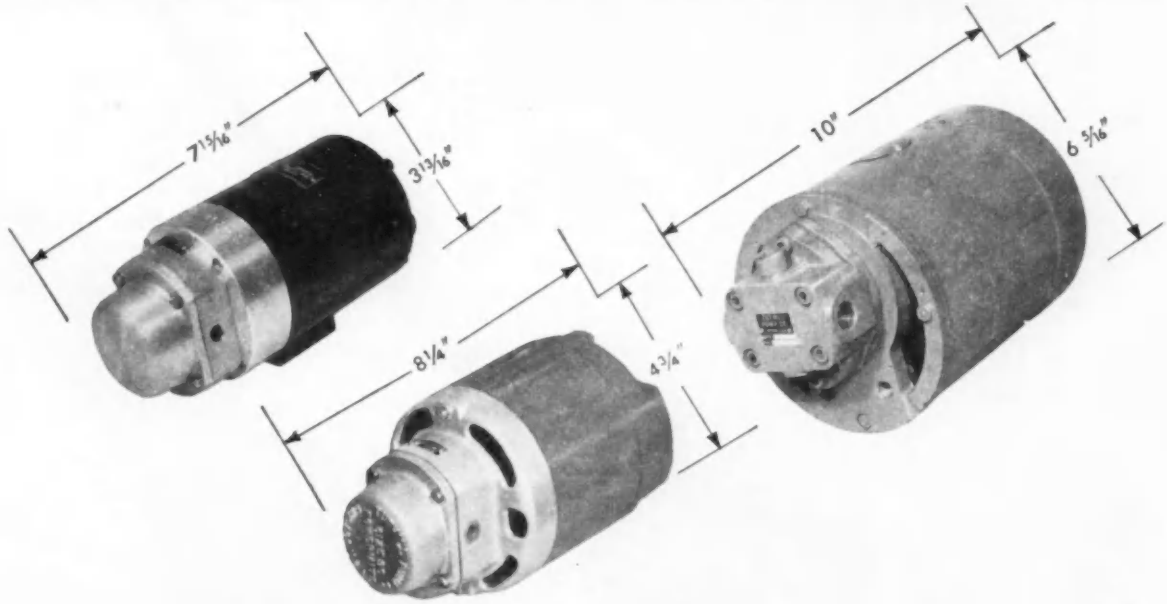
No matter what make of machine you use for milling or boring —no matter what metal or size or shape of piece—this service may lead to important competitive advantages. You have much to gain . . . nothing to lose by giving us an opportunity to study, with you, in your shop, the many factors involved in arriving at the winning combination *for you*. Just let us know when it would be convenient to get together. Write to: I-88

CUTTER DIVISION
THE INGERSOLL MILLING MACHINE COMPANY

505 FULTON AVENUE ROCKFORD, ILLINOIS

Circle 120 on Inquiry Card for more data

Cut Product Costs with POWERMITE



custom engineered pump and motor combinations

More and more manufacturers are learning the economy of incorporating Tuthill's exclusive Powermite Pump and Motor Combinations in their products. These custom engineered units incorporate a specially designed electric motor into a rotary gear pump . . . to produce a combination unit which takes up no more space and weighs no more, than a conventional electric motor.

The Powermite's compactness solves tough design problems. Its small size and low weight make it easier to install . . . boost production line productivity. The elimination of bases, couplings and other parts result in substantial economies. Its lower weight reduces shipping costs. And all Powermites provide the long trouble-free life which industry has learned to expect from Tuthill.

Wide range of combinations

A wide range of pump and motor combinations can be provided to meet individual requirements in hydraulics, lubrication, circulating, coolant, and other pump services. Three typical examples are shown above.

The compact unit to the left, developed for use on a small mobile hoist, combines an internal gear pump rated for 30 cu. in./min. at 500 psi, with a $\frac{1}{8}$ hp motor. The center unit, developed for a low pressure hydraulic application combines an internal gear pump with a capacity of 16 gph at 250 psi with a $\frac{1}{12}$ hp motor. The unit at right combines a high pressure hydraulic spur gear pump, for rated conditions of 1 gpm at 1,000 psi with a $\frac{3}{4}$ hp motor.

Custom engineered for your application

Each Powermite model is custom engineered for a specific OEM application and is designed to permit substantial economies for high volume production. A few Powermite models are available from stock—for example, the 350 psi, 16 gph model shown at center above. For small quantity applications Tuthill Close Coupled Pump and Motor Combinations can provide similar savings.

Manufacturers interested in learning more about the advantages of incorporating Powermite combinations into their products are invited to forward detailed specifications. Or, if preferred, a Tuthill Field Engineer will call.

TUTHILL PUMP COMPANY
941 East 95th Street
Chicago 19, Illinois

Gentlemen:

☐ Please have representative call to discuss Powermite applications in my product.

☐ Please send catalog describing complete Tuthill line.

NAME_____ TITLE_____

COMPANY_____

STREET_____

CITY_____ STATE_____

Tuthill Manufactures a Complete Line of Positive Displacement Rotary Pumps in Capacities From 1 to 200 GMP; for Pressures to 1500 PSI; speeds to 3600 RPM.

PUMPS FOR YOUR PURPOSE

TUTHILL PUMP COMPANY

941 East 95th Street, Chicago 19, Illinois

NFPA NATIONAL FLUID POWER ASSOCIATION

Circle 121 on Inquiry Card for more data

Seventy-five Years ◇◇◇

TEN MILES an hour was "speed" in 1883 when Wyman-Gordon started to make forgings for the high-wheel bicycle. Through the 75 intervening years forgings have made important contributions to the phenomenal advances in propulsion. Progress from the first "horseless carriages"...from the early "flying machines"...to the supersonic speeds of today ...would not have been possible without forgings produced by the most advanced techniques of the day.

Wyman-Gordon is proud of its achievements in these fields and, as the largest producer of automotive and aircraft forgings, is prepared to accept the challenge of the future. Today, as for 75 years, there is no substitute for Wyman-Gordon quality and experience.

WYMAN-GORDON COMPANY

Established 1883

FORGINGS OF ALUMINUM • MAGNESIUM • STEEL • TITANIUM

WORCESTER 1, MASSACHUSETTS
HARVEY, ILLINOIS • DETROIT, MICHIGAN

Circle 122 on Inquiry Card for more data

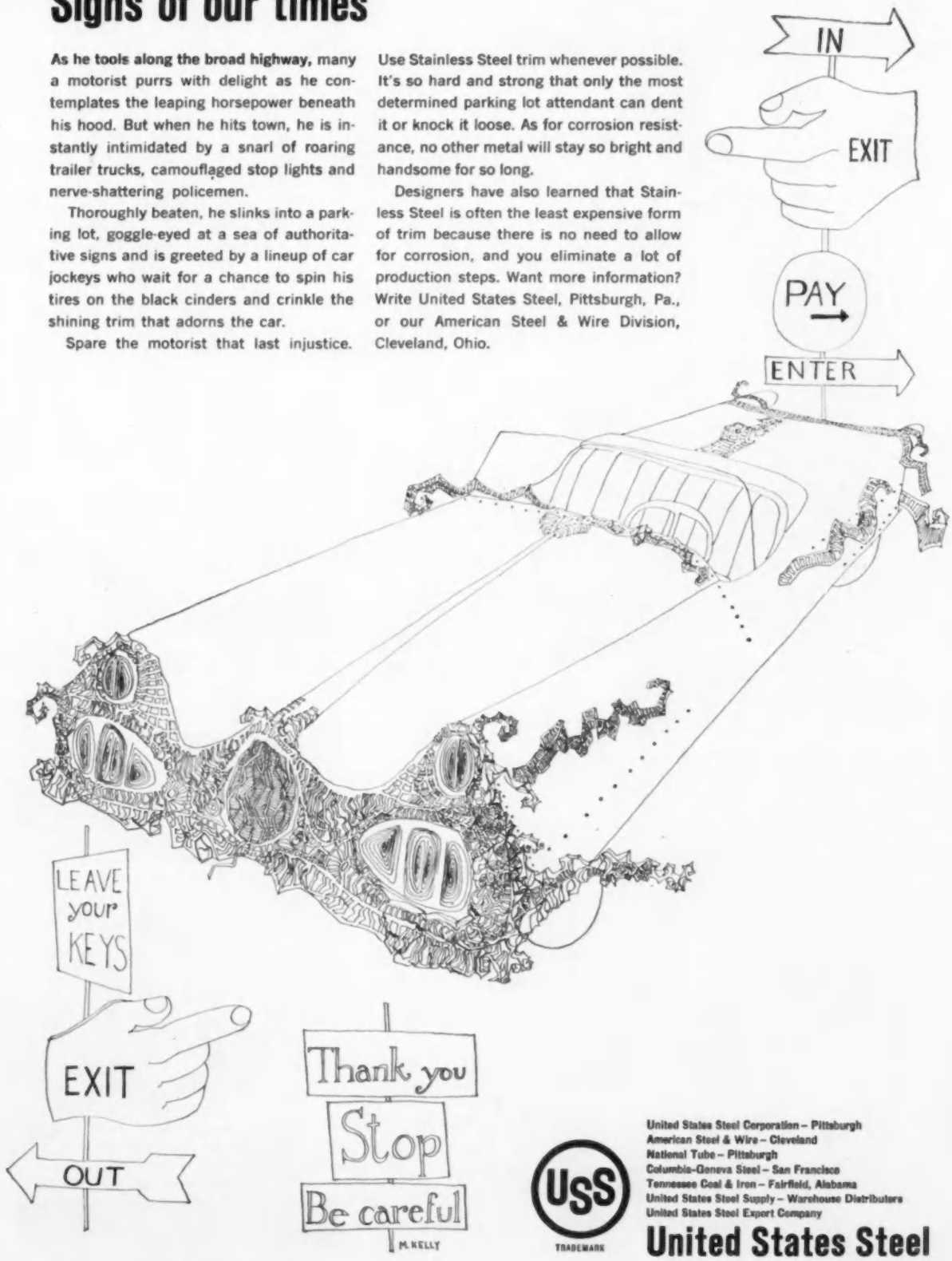
Signs of our times

As he tools along the broad highway, many a motorist purrs with delight as he contemplates the leaping horsepower beneath his hood. But when he hits town, he is instantly intimidated by a snarl of roaring trailer trucks, camouflaged stop lights and nerve-shattering policemen.

Thoroughly beaten, he slinks into a parking lot, goggle-eyed at a sea of authoritative signs and is greeted by a lineup of car jockeys who wait for a chance to spin his tires on the black cinders and crinkle the shining trim that adorns the car.

Spare the motorist that last injustice. Use Stainless Steel trim whenever possible. It's so hard and strong that only the most determined parking lot attendant can dent it or knock it loose. As for corrosion resistance, no other metal will stay so bright and handsome for so long.

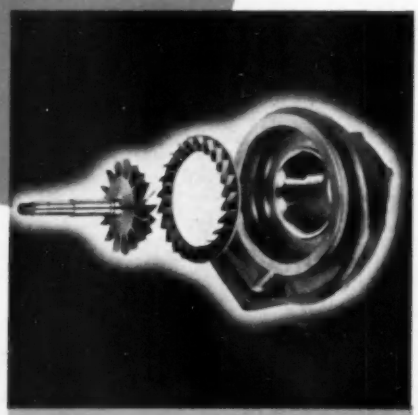
Designers have also learned that Stainless Steel is often the least expensive form of trim because there is no need to allow for corrosion, and you eliminate a lot of production steps. Want more information? Write United States Steel, Pittsburgh, Pa., or our American Steel & Wire Division, Cleveland, Ohio.



United States Steel Corporation – Pittsburgh
American Steel & Wire – Cleveland
National Tube – Pittsburgh
Columbia-Geneva Steel – San Francisco
Tennessee Coal & Iron – Fairfield, Alabama
United States Steel Supply – Warehouse Distributors
United States Steel Export Company

USS TRADEMARK

United States Steel



NEW! Prompt response to speed and load changes with Thompson Turbocharger

Moving parts in the new-design Thompson Turbocharger for diesel engines are made of light alloys to reduce inertia to speed changes. Response of the Thompson Turbocharger to variations in engine speed and air requirements is almost instantaneous . . . no ragged engine performance due to lag in blowing.

The light alloy impeller also permits bearings to be simpler in design. Shafts can be smaller in diameter to reduce bearing surface speeds and increase bearing life.

Other advantages of the new Thompson design include: straight-bladed impeller for high pressure ratios over wide range of air flow, new-design diffuser for peak performance over wider operating range, and unique design to isolate exhaust heat from bearings and air-side of Turbocharger.

Your diesel engines up to 300 horsepower can readily be equipped with Thompson Turbochargers . . . the most modern design available. A Tapco Group engineer will call at your convenience to work with your engineers.

Write today on your company letterhead for Booklet AI-1058, which contains technical data on Thompson Turbochargers for blown diesel engines up to 300 horsepower.

TAPCO GROUP
Thompson Products, Inc.
CLEVELAND 17, OHIO

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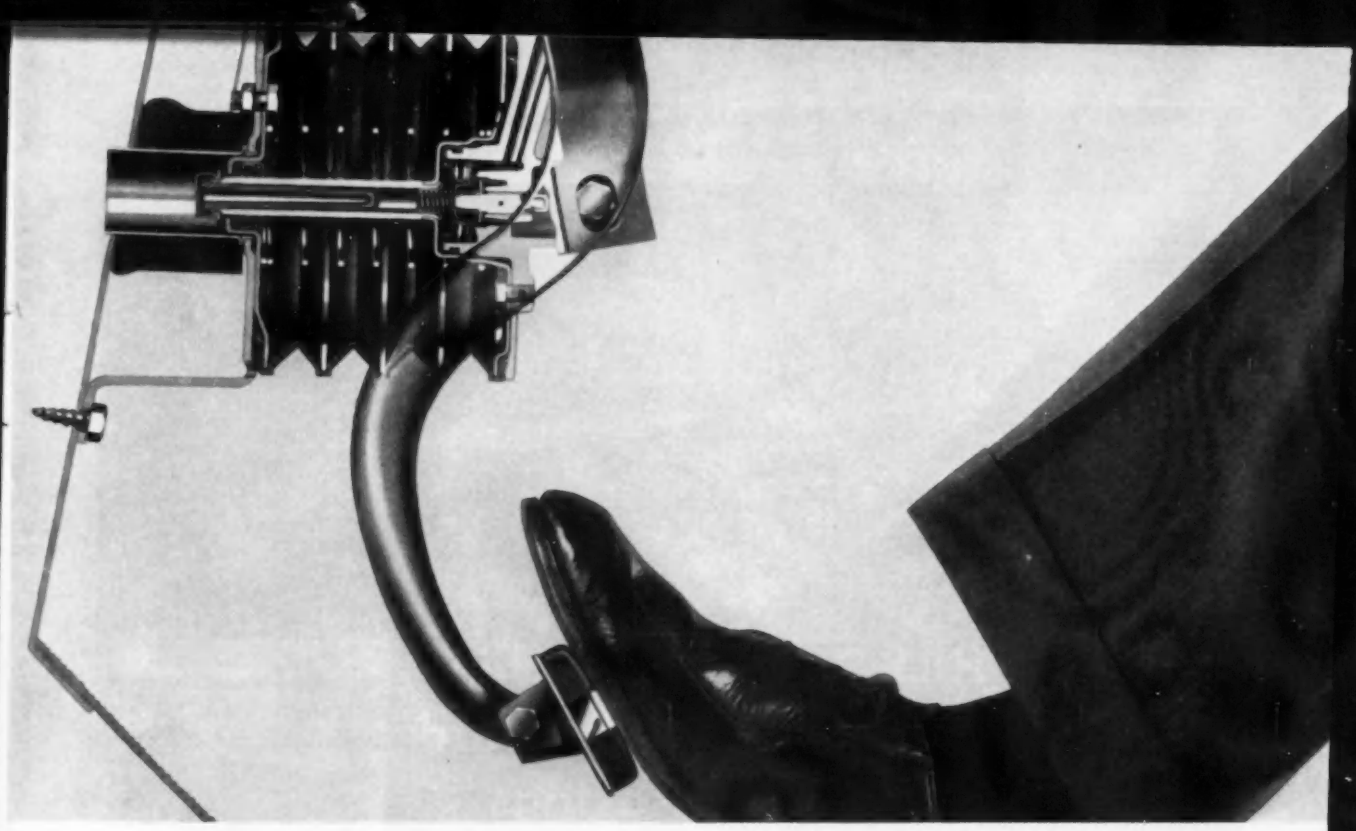


Neoprene power brake bellows exceeds 500,000 flex cycle minimum

This power brake unit is now being used by the Ford Motor Company on its Ford and Thunderbird passenger cars. The assembly is made for Ford by Kelsey-Hayes Company, and includes a bellows made of Du Pont neoprene.

Neoprene was the choice for this bellows because it proved its dependability to Kelsey-Hayes engineers in a series of preliminary tests. Most important was a test of its resistance to flex cracking.

Kelsey-Hayes specified a minimum flex life for this bellows of 500,000 cycles. A trial neoprene bellows passed without a trace of cracking. (Since then, sample bellows made of neoprene have been flexed over a million times without failure.)

Kelsey-Hayes engineers say that the neoprene bellows meets many other requirements as well. For example, it retains its resiliency and elasticity at temperatures from –40°F. to 200°F. It is resistant to oil, grease, ozone and abrasion. Another important advantage is neoprene's low degree of permanent set. This means that the bellows will keep its airtight seal for many years of dependable operation.

Neoprene synthetic rubber, made by Du Pont for 26 years, is also being used in many other automotive applications. Heater hose, fan belts, air springs, vacuum tubing . . . these are just a few.

Perhaps there's a Du Pont elastomer that can help you solve a particular problem. Mail the coupon below for more information on properties and uses of neoprene—as well as HYPALON and VITON, two other Du Pont automotive rubbers.

ELASTOMERS IN ACTION

HYPALON® • NEOPRENE
VITON
TRADEMARK

DU PONT
REG. U. S. PAT. OFF.

Better Things for Better Living
. . . through Chemistry

☐ I am particularly interested in _____

☐ Add my name to the free mailing list for *Du Pont Elastomer News for Automotive Engineers* (reviews new automotive applications of neoprene, HYPALON and VITON).

☐ Add my name to the free mailing list for the *Elastomers Notebook* (contains articles based on uses of Du Pont elastomers in industry).

E. I. du Pont de Nemours & Co. (Inc.)
Elastomer Chemicals Dept. AI-10
Wilmington 98, Delaware

Name _____
Firm _____
Address _____
City _____ *State* _____

Circle 125 on Inquiry Card for more data

HILL Sheet and Plate polishing machine with reciprocating hydraulic table and vertical two roll head.

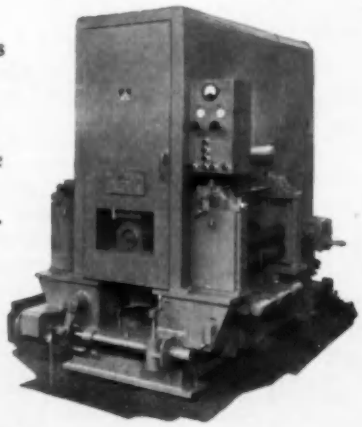
A HILL Polishing Machine of *YOUR OWN* will afford you important savings...

- *By eliminating mill extras.*
- *By proper finishing and prepolishing before forming.*
- *By enabling you to prepare the correct surface finish to meet each individual job need.*

IT'S MOSTLY IN THE HEAD

Two rolls accurately controlled for speeds and pressures with easy adjustment for proper tension of the endless abrasive belt. For fine finishing of all types of ferrous and non-ferrous metals.

● HILL polishing machines are now saving important percentages for manufacturers supplying the dairy and sanitation fields, for automobile bumpers, engravers plates and a wide variety of other industries.



HILL Pinch Roll type with vertical two roll head for polishing strip. Can be used singly or in multiple units for line production.

The HILL ACME Company

1209 W. 65th STREET • CLEVELAND 2, OHIO

"HILL" GRINDING & POLISHING MACHINES • HYDRAULIC SURFACE GRINDERS • ALSO MANUFACTURERS OF "ACME" FORGING THREADING • TAPPING MACHINES • "CANTON" ALLIGATOR SHEARS • BILLET SHEARS • "CLEVELAND" KNIVES • SHEAR BLADES

Circle 126 on Inquiry Card for more data

Timken-Detroit "3 for 1" Axles Are First Choice With Big Fleet Operators!

These superior features make the difference:

Interchangeability of Three Final Drives. Single-Speed Single-Reduction, Single-Speed Double-Reduction or Two-Speed Double-Reduction final drives using the same housing, hubs, drums, brakes and axle shafts gives your vehicles unmatched flexibility. Parts are readily available and less expensive.

Hypoid Gears. Larger pinions and greater tooth contact give 30% more torque capacity, top efficiency and long life . . . plus lower maintenance costs.

True Double Reduction. Two full size gear sets, one for each reduction, provide huskier gears and a balanced distribution of effort. Gears and bearings last longer and need less maintenance.

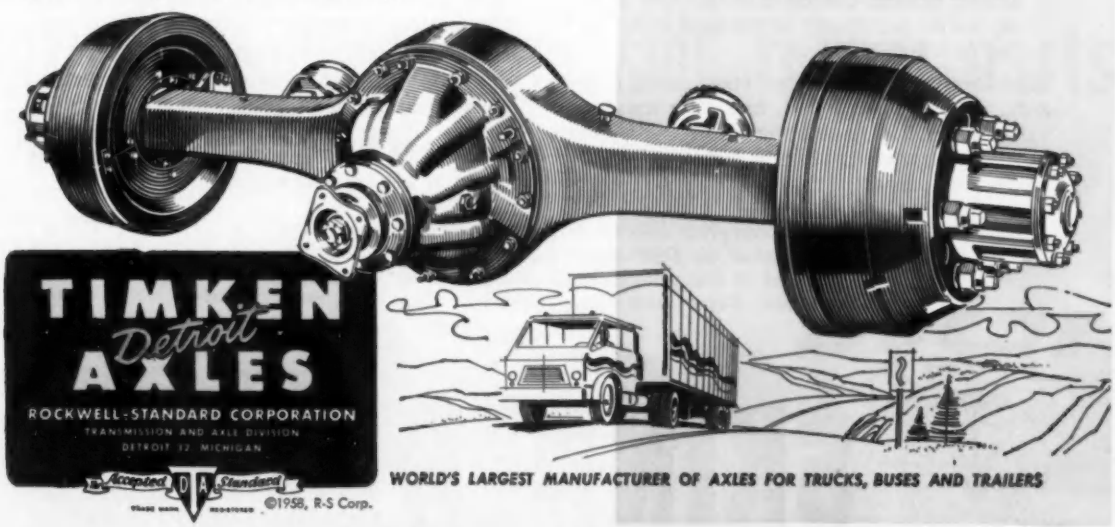
Torsion Flow Axle Shafts. More splines, plus greater root and body diameter, add extra strength.

Famous Time-proved Differential. Extra-strong gear body and teeth, plus hot-forged trunnion, give long trouble-free operation even under the roughest kind of treatment.

Hot-Forged Steel Axle Housing. The rectangular form of these high carbon steel housings is the lightest, strongest shape of housing that is available today.

PROVED AND PREFERRED...

Timken-Detroit® Axles are the Accepted Standard!



TIMKEN Detroit AXLES
ROCKWELL-STANDARD CORPORATION
TRANSMISSION AND AXLE DIVISION
DETROIT 32, MICHIGAN
Accepted Standard

©1958, R-S Corp.

WORLD'S LARGEST MANUFACTURER OF AXLES FOR TRUCKS, BUSES AND TRAILERS

Products of **ROCKWELL-STANDARD** Corporation

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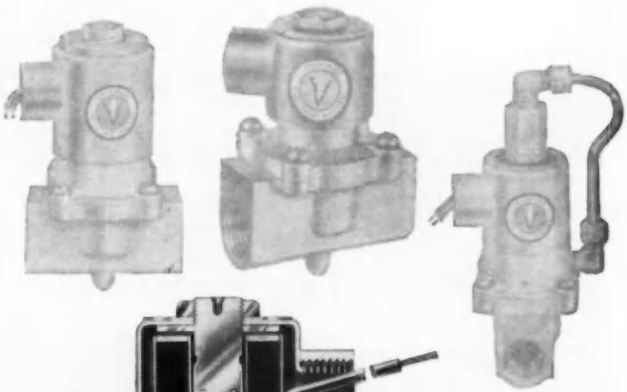
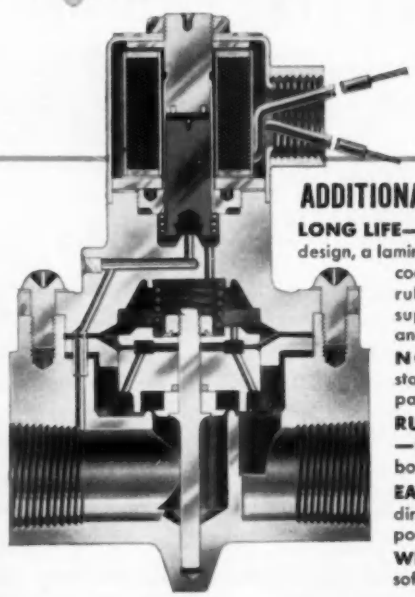
New low-cost, high-flow, 2-way valves with . . .

DEPENDABLE SKINNER QUALITY





ADDITIONAL FEATURES

LONG LIFE—unique diaphragm design, a laminate of nylon fabric coated with Buna N rubber, completely supported in open and closed positions.

NO RUSTING—stainless steel internal parts.

RUGGED DESIGN—forged naval brass body.

EASY TO MOUNT—direct to line in any position.

WILL NOT LEAK—soft, synthetic inserts.

L SERIES

These L Series valves with ¾″ and 1″ diameter orifices complete an *all new* line of 2-way valves previously introduced in January in the ⅜″ and ½″ sizes.

Manufactured to the highest engineering standards, these pilot-operated, high-flow industrial valves are a welcome addition to the famous Skinner solenoid valve line. They are smaller and more compact than the M2 Series they replace and feature a unique diaphragm design. They are also considerably lower in cost. The ¾″ size, for example, will cost you 51% less.

These larger L Series models – ¾″ and 1″ – will be available in standard and Explosion-proof construction, normally open or normally closed. They operate on a pressure differential of 5 to 150 psi and will control such common media as air, oil and water.

For complete information, please contact our Representative or Distributor near you . . . you'll find him listed in the yellow pages or write us at the address below, Department 330.

SKINNER ELECTRIC VALVES

THE CREST OF QUALITY

SKINNER ELECTRIC VALVE DIVISION

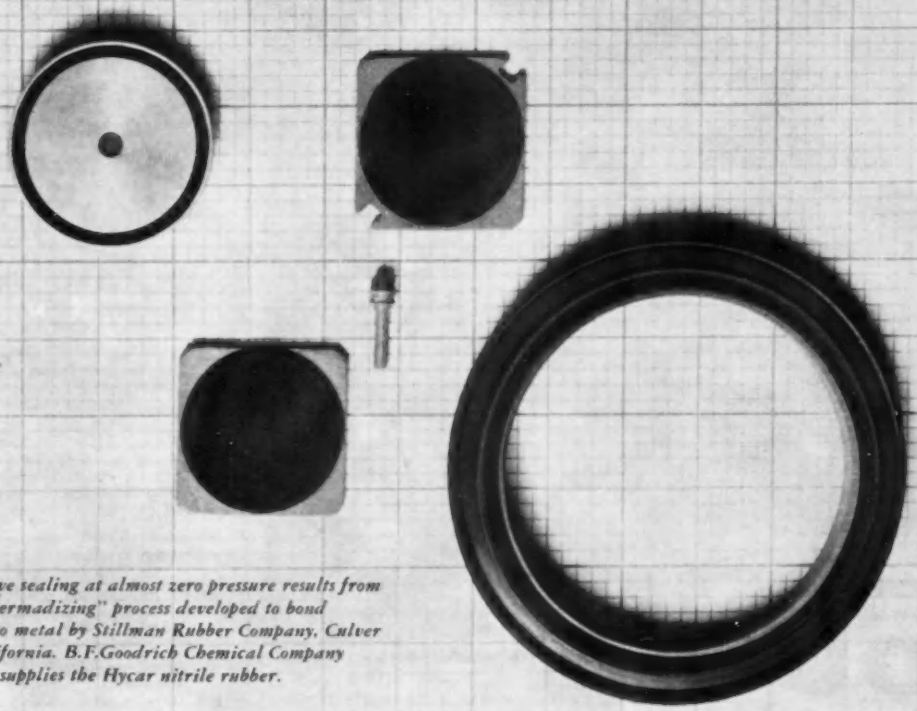
NEW BRITAIN CONNECTICUT

105 EDGEWOOD AVENUE

Circle 128 on Inquiry Card for more data

Another new development using

B.F.Goodrich Chemical *raw materials*



Effective sealing at almost zero pressure results from use of "Permadizing" process developed to bond Hycar to metal by Stillman Rubber Company, Culver City, California. B.F.Goodrich Chemical Company supplies the Hycar nitrile rubber.

Optically-smooth precision rubber parts

...made possible by new Hycar-to-metal bonding

The seals above are made of rubber, they are ground to dimensional tolerances you usually expect only from metal. As a result, they can be used to seal fluids with a wider temperature range than ever before. They illustrate the advantages of using Hycar nitrile rubber bonded to metal. Hycar can be ground to dimensional tolerances as fine as 5 micro finish.

Oil-resistant Hycar can be used without fear of low temperature brittleness. Operating temperatures can be as low as –65°F. and as high as 250°F. Parts are also flash free.

The exceptional qualities and properties of Hycar lead to new applications or new products for many industries. You can get more information by writing Dept. KF-5, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

Hycar
American Rubber

B.F.Goodrich Chemical Company
a division of The B.F.Goodrich Company

SEE US AT BOOTH NO. 509
9TH NATIONAL
PLASTICS EXPOSITION
NOV. 17-21
INT'L AMPHITHEATRE—CHICAGO

B.F.Goodrich

GEON polyvinyl materials • HYCAR American rubber and latex
GOOD-RITE chemicals and plasticizers • HARMON colors

Circle 129 on Inquiry Card for more data

HIGHEST COMPRESSIVE STRENGTH *of all* DRY BEARINGS

GLACIER

DU

THE SENSATIONAL BREAK-THROUGH IN DRY BEARING TECHNOLOGY

DU—a steel-backed porous bronze bearing material, impregnated with a permanent, solid, T.F.E.* fluorocarbon resin-lead lubricant—withstands loads up to 23 tons per sq. in. with *no cold flow.*

In addition, its wear resistance 10 to 100 times that of other dry bearings—

Its extremely low coefficient of friction, with no slip-stick characteristics—

Its consistent performance at temperatures ranging from 328 degrees below zero to 500 above—

Its immunity to detergents, solvents, corrosive chemicals, alkalies, abrasive atmospheres—

Its ability to run submerged in liquids—usually with improved performance—

Its positive elimination of contamination from oils and greases—

All these unique characteristics make GLACIER DU the most sensational break-through in dry bearing technology.

Consider what this new bearing material can mean to your products. Ask your bearing manufacturer or write for complete brochure to—

SPECIAL PRODUCTS DEPT.
United States Gasket Company
Camden 1, New Jersey

*TEFLON, *du Pont Trademark*
FLUON, *I.C.I. Trademark*

United States Gasket *Plastics Division of* **GARLOCK**

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CALENDAR

OF COMING SHOWS AND MEETINGS

International Commercial Motor Transport Exhibition, Earls Court, London .....Sept. 26-Oct. 4

Pressed Metal Institute, annual meeting, The Cloisters, Sea Island, Ga. .....Sept. 28-Oct. 2

SAE National Aeronautic Meeting, Production Forum and Aircraft Engineering Display, Ambassador Hotel, Los Angeles, Calif. .....Sept. 29-Oct. 3

ASTE Semi-Annual Meeting and Western Tool Show, Shrine Exposition Hall, Los Angeles, Calif. .....Sept. 29-Oct. 3

Fourth Joint Military-Industrial Packaging and Materials Handling Symposium, sponsored by Dept. of Navy, Washington, D. C. .....Sept. 29-Oct. 5

Paris Automobile Show .....Oct. 2-12

National Noise Abatement Conference, annual meeting sponsored by Armour Research Foundation, Hotel Sherman, Chicago, Ill. .....Oct. 9-10

Gray Iron Founders' Society, Inc., 30th annual meeting, Sheraton-Park Hotel, Washington, D. C. .....Oct. 9-10

National Electronics Conference, Hotel Sherman, Chicago, Ill. Oct. 13-15

AIEE Annual Machine Tool Conference, Statler Hilton Hotel, Hartford, Conn. .....Oct. 13-15

Packaging, Handling, and Shipping Show, sponsored by Society of Industrial Packaging and Materials Handling Engineers, Chicago Coliseum, Chicago, Ill. .....Oct. 14-16

National Conference on Industrial Hydraulics, Hotel Sherman, Chicago, Ill. .....Oct. 16-17

American Society of Industrial Designers, annual design conference and meeting, Bedford Springs, Pa. .....Oct. 18-21

National Rubber & Plastics Instrumentation Symposium, sponsored by Instrument Society of America, Akron, O. .....Oct. 20-21

SAE National Transportation Meeting, Lord Baltimore Hotel, Baltimore, Md. .....Oct. 20-22

National Management Association, annual meeting and national conference, Statler-Hilton Hotel, Los Angeles, Calif.....Oct. 20-24

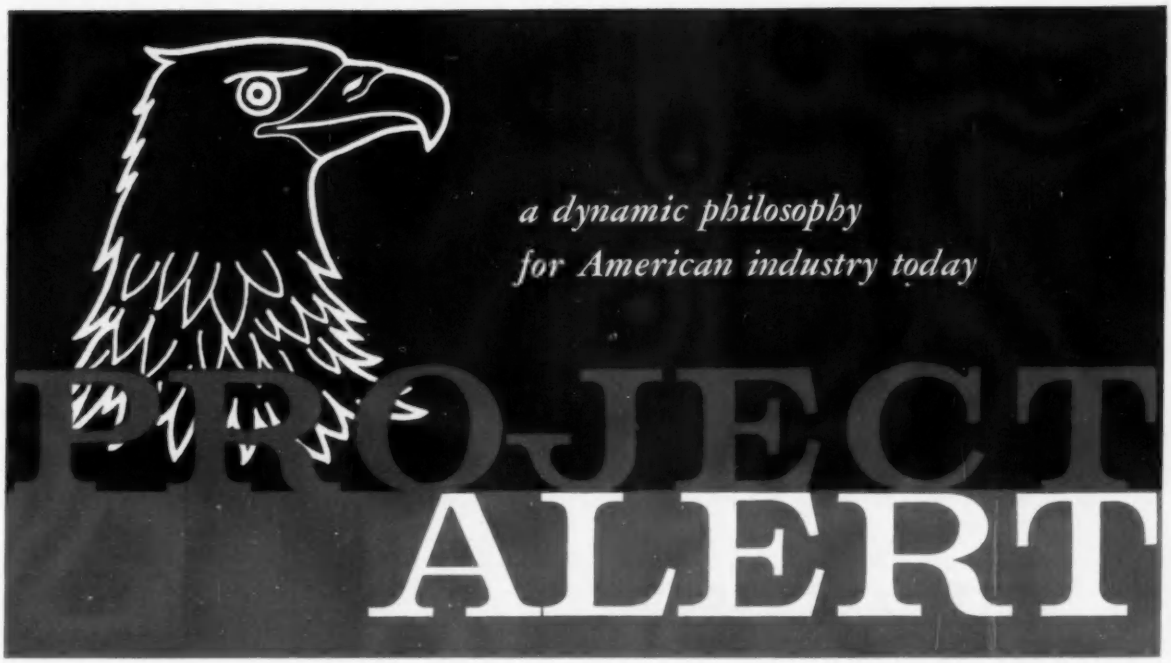
SAE National Diesel Engine Meeting, Lord Baltimore Hotel, Baltimore, Md. .....Oct. 22-24

American Society of Body Engineers, annual technical convention, Rackham Memorial Bldg., Detroit, Mich. .....Oct. 22-24

International Motor Show, Earls Court, London .....Oct. 22-Nov. 1

Aeronautical and Navigational Electronics, annual East Coast Conference, Lord Baltimore Hotel, Baltimore, Md. ....Oct. 27-28

Industrial Management Society, annual industrial engineering and management clinic, Hotel Sherman, Chicago, Ill. .....Nov. 5-7



The purpose of this project is to establish a creative attitude of *dynamic alertness* on the part of all personnel in American industry.

Dynamic alertness is alertness on the move . . . is a positive, constructive way of thinking . . . a spirited new attack on your problems. It is swinging into action to get things done today . . . to insure a brighter, more prosperous future.

Three key words express the attitude of *dynamic alertness* . . .

1. **Observation:** This means inspiring your people to look at your problems with curiosity and creative imagination. It is taking a walk through your plant and looking at things as though you are looking at them for the first time. It is cutting through the fog of complacency and seeing things with new eyes. It is looking for new ways to stop leaks and losses; searching for new ways to speed production and efficiency.

2. **Concentration:** This means the intense application of the mind power of everyone to specific problems. It is the starting of new creative fires in your organization. It is having key people ask themselves key questions: How can I do my job better? How can I speed the flow of work? How can I cut down on errors? It is applying individual and group thinking to a list of things to be done and sticking with them until they are finished. It is preparing today to solve the problems of tomorrow.

3. **Devotion:** This represents a new vital spirit of rededication to your company, to your customers, to your industry, to America. It is a return to the creative ingenuity that made this nation great . . . finding a way or making one. It is having the power and purpose to go forward, to believe in the future, to move ahead to better things.

We at Udylite believe in Project Alert. All of us, to a man, are pledged to a policy of dynamic alertness in every facet of our jobs . . . in our contacts with fellow workers . . . in the handling of equipment . . . on the production line . . . in our contacts with suppliers and customers.

C. H. Reeme, *president*
The Udylite Corporation

the udylite corporation
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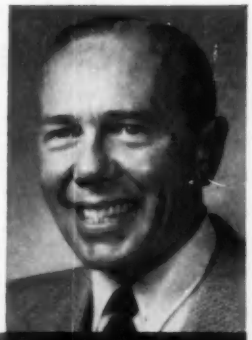
World's Largest Plating Supplier



Make Project Alert work for you

Apply this dynamic philosophy to your firm. New, fresh creative imagination, newer, better production methods, newer more reliable equipment applied to the job *now* . . . will pay off in a brighter, more prosperous tomorrow. Write for a free copy of the Project Alert folder and a free Project Alert lapel button. There's no obligation, of course.

PROJECT ALERT

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GVW vs PAY-LOAD

WHERE A POUND SAVED IS A DOLLAR EARNED!

By saving dead weight, vacuum power can add several hundred pounds to pay-load, and earn extra dollars, as ton-miles build up.

In addition there is vital safety in having physical braking instantly available should power fail for any reason.

For these and other important reasons, vacuum power is the overwhelming choice on trucks, and HYDROVAC* leads all other makes combined.

...It will pay you to look into

HYDROVAC (VACUUM HYDRAULIC) POWER BRAKING BY BENDIX

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Bendix PRODUCTS DIVISION South Bend, IND.

Bendix AVIATION CORPORATION

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High Spots of This Issue

▼ Saginaw Power Steering Gear

Saginaw Gear Div.'s new rotary valve type, integral power steering gear for 1959 cars was designed to combine positive response of manual gear with smoothness and lightness of a power gear. How well these design objectives are realized is told here. Page 48.

▼ Automation Techniques at Ford's Lima Plant

Ford Motor Co.'s new Lima engine plant represents the very latest in automation techniques, with fully automatic machine loading and unloading, and a host of transfer-type machines for such components as cylinder blocks and heads, and intake and exhaust manifolds. Page 50.

▼ Chrysler Imperial Assembly Facilities

This article covers the new Chrysler Imperial assembly facilities in Dearborn, Mich., which feature an advanced zone-type inspection system, an automatic body control switching system, and a testing procedure which includes road testing of every car. Page 54.

▼ Farnborough Air Show

The emphasis in this year's Farnborough Air Show was on vertical flight and missiles, although new developments in jet engines and rockets were very much in the picture. David Scott covers the show's highlights in this informative report. Page 58.

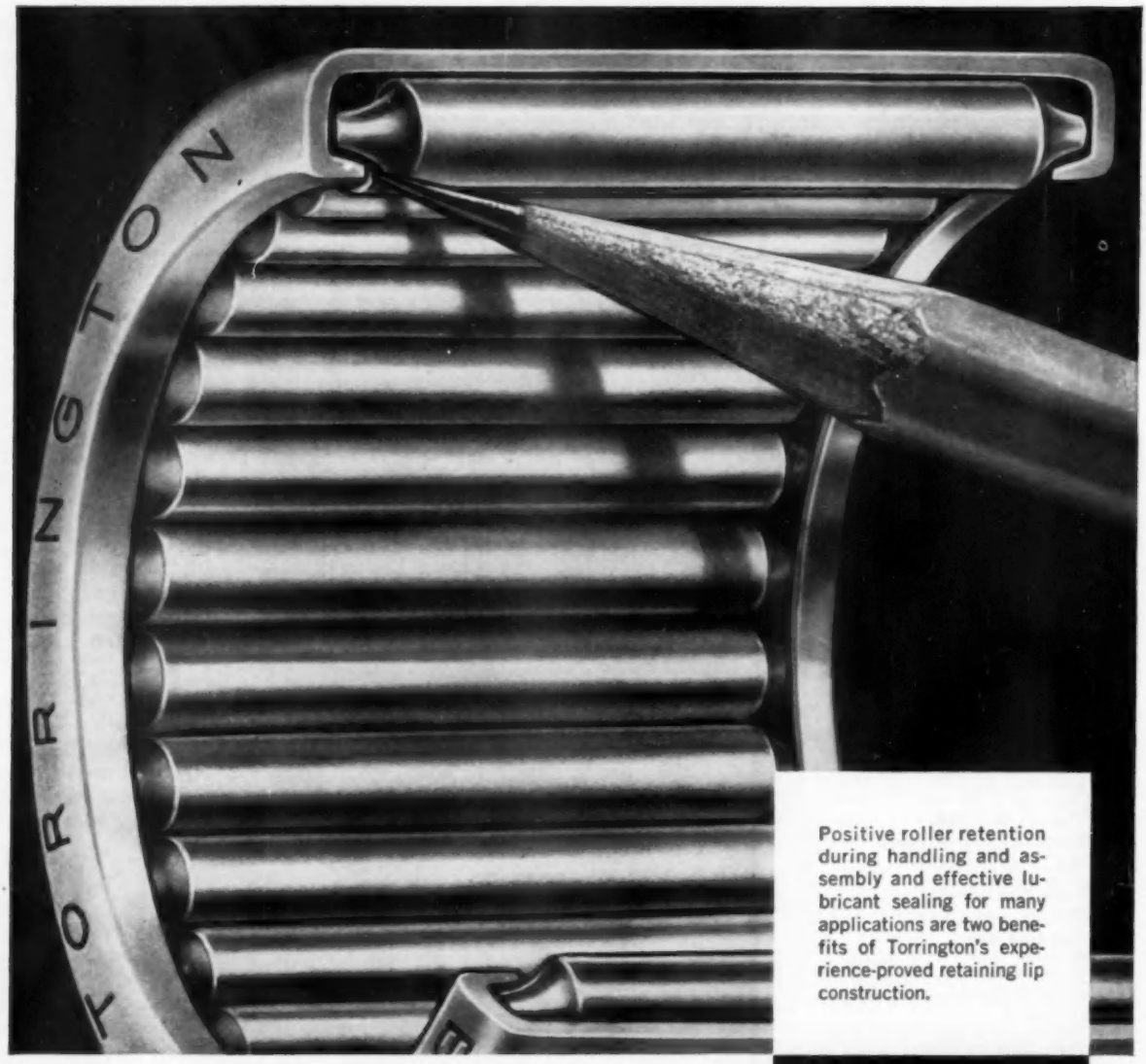
▼ Polish Truck Factory

The Starachowice truck factory, the most highly integrated automotive plant in Poland, makes everything from its own pig iron to bricks for new buildings. It is also notable because it produces a vehicle of all-Polish design. Page 64.

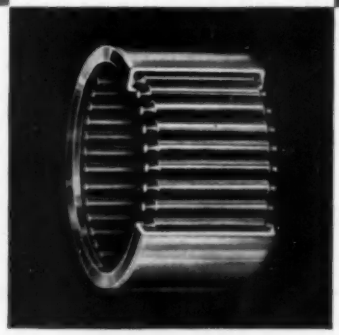
▼ 22 New Product Items And Other High Spots, Such As:

The new cars: Cadillac, Chrysler Imperial, Rambler station wagon, Ambassador, and Oldsmobile; the new Chevrolet truck; road test simulator; special handling equipment; and industry statistics.

AUTOMOTIVE INDUSTRIES COVERS
PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES • BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY • PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT • SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT
ENGINEERING • PRODUCTION • MANAGEMENT



Positive roller retention during handling and assembly and effective lubricant sealing for many applications are two benefits of Torrington's experience-proved retaining lip construction.



This little lip makes a big difference!

The turned-in lip at each end of Torrington Needle Bearings positively retains the trunnion - end rollers and makes the bearing truly a complete unit, with no possibility of roller fall-out.

This unit construction simplifies installation and servicing. The closely controlled clearance and the large area between cup lips and shaft form an effective labyrinth seal. Also this retaining lip allows pregreasing the bearing with the proper lubricant for each application.

Long experience with the Torrington Needle Bearing in thousands of applications has proved the merit of this and other features in efficient performance and long service life. Make sure *your* product benefits from the best that experience has to offer—specify Torrington Needle Bearings. **The Torrington Company, Torrington, Conn.—and South Bend 21, Ind.**

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News

OF THE AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 119, No. 7 **October 1, 1958**

AMC's Head See Possibility Of Plant Expansions in 1959

American Motors Corp. may find it necessary to expand production and assembly facilities at its Wisconsin plants during the coming year if the company's 1959 product sells as well as president George Romney hopes.

AMC has set an ambitious sales goal of 252,000 Ramblers for 1959. But Romney, exuding optimism at the press preview of the new line, expressed a hope of cornering six per cent of a five million car market. This would be 300,000 units, well above AMC's rated assembly capacity at Kenosha.

Romney indicated a decision on expansion would be based on sales during the October-December quarter. He also hinted, however, that the company could take other steps to gain additional production, such as using idle capacity at AMC's Canadian plant or changing the "make-buy" policy on certain components to provide additional floor space for assembly. It does not appear likely, however, that AMC will spend any money on a major plant expansion program in the near future.

The company, although currently showing a tax-free profit, still hovers on the line between gain and loss. This will not be the year to pour money into plant facilities, since Rambler is entering its fourth year with the same basic body shell.

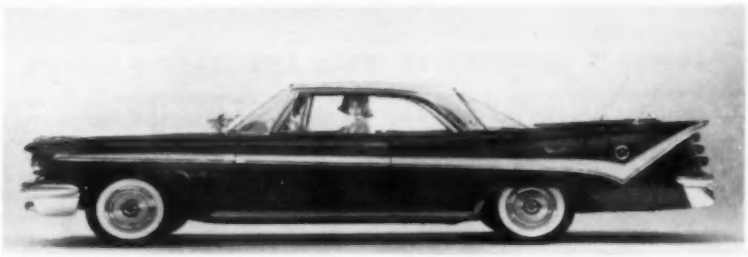
Any expenditures during the next 12 months more likely will go into tooling a new car for 1960. Romney, in fact, admitted that current plans for 1960 include the possibility of a "complete model change." So the company probably will be satisfied during 1959 just to level off production at 250,000 units (if sales get that high) and make Rambler a scarce but profitable item.

Romney told newsmen at the preview that current plans call for schedule increases for the 100-in. wheelbase Rambler American and also the station wagon models in all series.

Production of the Rambler American has been running at 23 per cent and is due to go up to 27 per cent of AMC's total in 1959. Station wagons, which accounted for 44 per cent of total output during the '58 model year, are being pushed up to 50 per cent.

AMC is starting the year optimistically. Roy D. Chapin, Jr., automotive executive vice-president, said that production during the first five days of the '59 model run was at the rate of 600 units a day. This rate, however, was boosted to 856 a day by Sept. 10, the day of the preview, and slated for further acceleration to 960 cars a day by Oct. 1. Chapin said the Wisconsin plant forces are being increased by 1500 employes as a second shift is added at Kenosha.

Roy Abernethy, vice-president of automotive marketing and distribution, said that sales for the 1958 model year should wind up at 170,000



De Soto Offers Sports Engine On All Models of 1959 Line

De Soto Div. of Chrysler Corp. announced that the Adventurer sports engine will be available for the first time on all models in the De Soto line.

The 383-cu in. Adventurer delivers 350 hp at 5000 rpm and has a torque of 425 lb/ft at 3600 rpm. It is equipped with two 4-barrel carburetors, a special camshaft, distributor, air cleaners, valve springs and dampers. Bore and stroke are 4.25 in. and 3.38 in., and compression ratio is 10.1 to 1.

De Soto's three Turboflash engines —FireFlite, FireDome, and FireSweep — have been modified to develop greater power, the division said. Displacement on the FireFlite and FireDome is 383 cu in. and compression ratio is 10.1 to 1. Bore and stroke on both series are 4.25 and 3.38 in. Engine torque is 425 lb/ft at 2400 rpm for the FireFlite, and 410 lb/ft at 2400 rpm for the FireDome.

The FireSweep, with a bore of 4.12 in. and a stroke of 3.38 in., has a displacement of 361 cu in. and a compression ratio of 10.1 to 1. Torque is 390 lb/ft at 2400 rpm.

The FireFlite has a four-barrel carburetor; the FireDome and FireSweep, a two-barrel carburetor. All convertibles and the Adventurer feature dual exhausts.

Horsepower for the FireSweep is 290; for the FireDome, 305; and for the FireFlite, 325.

News AUTOMOTIVE AND AVIATION

AUSTIN IS COMBINATION SEDAN AND STATION WAGON

Sedan and station wagon features are combined in the Austin A40 which has a full-length roof extending over the rear seat and trunk. Luggage space, reached by the vertical trunk lid bottom hinged like a tailgate, can be increased to 18¾ cu ft by unclipping the parcel shelf and folding the rear seat forward. Designed by Pinin Farina of Italy, the A40 has an integral body shell with unobstructed underside, and is powered by the 57.8 cu in. engine used in the smaller cars made by the British Motor Corp.

units, including the imported Metropolitan. This, he said, will be 94 per cent of AMC's goal for the year.

Romney believes that, while industry sales rise during 1959, Rambler sales will rise at a "substantially faster" rate. Smaller cars will account for some 15 per cent of total domestic sales during the coming year, according to him.

The entry of the Big Three into the small car field (although not expected in 1959) should help Rambler, in the opinion of the AMC chief. This is "our league, and they will have to play the game our way," he emphasized. By this, Romney meant that Rambler has a head start and a backlog of customers, plus an established small car name, with no internal competition from bigger cars. He added that it is "doubtful if any of the Big Three could operate a plant with double AMC's 120,000 unit break-even point."

Chrysler, Ford Claim Progress In Development of Gas Turbine

Spokesmen for both Chrysler Corp. and Ford Motor Co. have revealed significant progress in development of the gas turbine engine.

Both companies have been working for several years toward a producible gas turbine.

Paul C. Ackerman, Chrysler vice president-engineering, says his company has made "very satisfactory progress" in turbine development in the last two years. He says the time is not far off when Chrysler's experimental turbine cars will be superior to any piston engine we can foresee" in fuel economy, mechanical reliability and vibration-free operation.

In 1956, Chrysler made a test run of a turbine-powered Plymouth from New York to Los Angeles. Since then, experimental vehicles have been tested by Chrysler in and around Detroit for practical application of laboratory findings.

Ackerman admits he is "not prepared to tell" when or if Chrysler will be in a position to bring to market a turbine-powered car.

Ford's director of engineering research and advanced product study, A. L. Haynes, revealed recently that Ford's experimental gas turbine known as "702" indicates tremendous possibilities for the future of automotive turbines.

The 702 is a composite of separately tested components. Haynes says that, in the development of the engine, two major obstacles were passed. He listed these as turbine wheel cost and heat exchanger.

Ford has been able to reduce the turbine wheel cost from several thousand dollars to less than $100, according to Haynes. The 702 heat exchanger more than doubles the temperature of the compressor air prior to ignition, he said, thus cutting fuel consumption considerably.

Ford's Three-Year Agreement Sets Pattern for Big Three

The three-year "non-inflationary" contract between the Ford Motor Co. and the United Auto Workers set a basic pattern for eventual agreements by the other members of the big three, Chrysler and General Motors.

Ford was the first of the automobile manufacturers to settle. Peace at the bargaining table was made Sept. 17, just hours after the UAW began a nationwide strike at Ford's 86 plants.

But labor peace and full production did not follow directly. UAW skilled workers at the giant Ford Rouge plant in Dearborn were not satisfied with the contract and they did not return to work as ordered by the union. The rebel strikes continued into a period when production was scheduled for normal.

The three-year contract included improvements in wages, supplementary unemployment benefits (SUG), pensions, and severance pay. Skilled workers got an additional 8 cents on top of the general wage increase, but the Rouge plant skilled groups did not feel this was enough.

The offers from Chrysler and GM were nearly identical to the Ford settlement. Chrysler included some demands of its own regarding contract coverage and union representation.

But all three contained the same basic wage formula, which provided a continuation of the 1955 annual improvement factor of 2.5 per cent or 6 cents an hour, whichever is greater, plus quarterly cost-of-living adjustments. This formula was offered last spring by the three companies. Hence, the new Ford contract is not much different than the one which expired six months ago.

The total wage and fringe package is estimated at approximately 9.5 cents an hour immediately, plus a 7 cent increase in 1959, and another 7 cents in 1960.

Company and union spokesmen call the settlement "non-inflationary." Considering that the companies were willing to grant practically the same terms last spring, the contracts actually might be non-inflationary. They certainly are less inflationary than the union's original demands would have been.

The addition of a third year makes the Detroit labor situation just that much more stable.

Settlement is expected to bring an upturn in new car sales, steel orders, machine tool orders, and other economic indicators, plus a general aura of stability in the industry.

CHRYSLER CORP. OFFERS WIDE RANGE OF SIMCA CARS FOR 1959

Chrysler Corp. is out to get 15 per cent of the imported car market in the U. S. with a wide range of French-built Simca automobiles. Five Simca models—including four-cylinder sedans and station wagons and V-8 sedans—are now available through Chrysler's distribution system in the United States, which may ultimately include non-Chrysler outlets. Shown here from left to right are the Elysee four-door sedan, the Grand Large two-door hardtop, and the Chatelaine two-door station wagon.

Chrysler Announces Its Plans For Simca at Home and Abroad

Chrysler Corp. has taken quick action on its latest venture—the acquisition of 25 per cent interest in Simca—and plans are being made for exploitation of the small French passenger car at home and abroad.

At home, Chrysler is proceeding with plans for distribution of the Simca line in the U. S. through Chrysler Motors Corp. Despite at least three law suits by distributors holding agreements directly with Simca, Chrysler is drawing up a distribution scheme for the domestic market.

Chrysler's ultimate distribution pattern, however, may include the three independent distributors as well as other non-Chrysler outlets.

Abroad, Chrysler has organized a new corporation to handle the Simca as well as other Chrysler products in certain areas of the world market.

Chrysler International, S.A. will be headquartered in Geneva, Switzerland and will have major regional offices in Western Europe, Latin America and the Sterling area.

Chrysler International and Simca will split the market according to the strength of sales organizations. Chrysler International, for instance, probably will handle Latin America for all lines, since Chrysler already has an effective organization in that area.

Chrysler recently acquired 15 per cent of Simca stock from Ford Motor Co. and an additional 10 per cent from Swiss financial interests.

Meanwhile, Chrysler is preparing a 221,631 sq ft plant in Rotterdam, The Netherlands, for production of the Simca Aronde. The plant recently was purchased from Nederlandse Kaiser-Frazer Fabrieken N.V.

In this country, Chrysler hopes to up the Simca market penetration to 15 per cent of small foreign car sales. Richard N. Meltzer Advertising, Inc. has been named to handle Simca ads in the U. S. and Canada. Meltzer has handled Simca, Inc, the U. S. distributor, in the past year.

S-P Stockholders Will Vote On Refinancing Proposals

Stockholders of Studebaker-Packard Corp. will vote Oct. 15 on a refinancing plan which may result in automobile manufacturing being pushed to the background.

At a special meeting, shareholders must approve a series of proposals including diversification, new stock issues, new credit and new members of the board of directors.

A major point in the plan includes converting $54.7 million of debt, which is due next year, to $16.5 million of 15-year secured notes and a new issue of $100 preferred stock. This step would forestall payment of a large piece of cash and give S-P more time to develop its other plans.

The company's South Bend automobile plant will be mortgaged to secure the 15-year notes, under terms of the proposal This move puts the car-making business on the spot.

Diversification, however, holds an important key to the future. Although no definite plans have been revealed, S-P is forming an acquisitions committee to find profitable ventures which the corporation can take over and use for tax credits. A. M. Sonnebend, Boston financier, will head the committee.

One report links S-P with the phonograph recording industry, a field far from automobile manufacturing. Other rumors have mentioned textiles and food.

S-P also is moving to strengthen its import plans at the same time. Another proposal calls for the establishment of a $7 million credit with Daimler-Benz of Germany to finance the importing of Mercedes-Benz automobiles and spare parts. This move will allow S-P to continue its import program while freeing additional funds for use in its domestic plans.

Its immediate domestic plans, as reported earlier, include the manufacture of a smaller economy car, to be introduced this fall. Diversification, and subsequent tax benefits, could aid the company in further development of a marketable small car for domestic production.

Meanwhile, the directors elected A. J. Porta executive vice-president of S-P. He formerly was financial vice-president of the firm.

Buick Reveals Price Hike, New Models Will Be Labeled

Buick, first of the new automobiles to make a public appearance, carries a slightly higher factory list price in 1959. And Buick, along with all other passenger car makers, must label its vehicles with a "fair" suggested list price for all to see.

The slightly higher price on Buick cars indicates that all manufacturers will raise their prices this year. The increases result from higher labor-materials and parts costs and operating expenses.

The price labels result from a new law — Automobile Information Dis-

NEWS AUTOMOTIVE AND AVIATION

RESTYLED ROVER HAS WRAPAROUND WINDSHIELD

Rover 3-Liter is powered by 183-cu in., six-cylinder engine that develops 115 hp at 4250 rpm. Design features include a 7-bearing crankshaft, overhead inlet and exhaust valves, roller-type tappets, and cross-flow radiator. Drive is through a four-speed manual gearbox with overdrive, with a Borg-Warner automatic transmission as an option. Front suspension is by laminated torsion bars, and ground clearance is 7½ in. A major styling change is the full wraparound windshield with cranked door pillars, and large side and rear windows.

closure Act—which requires manufacturers to inform the public of the suggested retail delivery price, along with other pertinent information.

The price label, incidentally, will add an estimated 50 cents to the price of the car.

The new Buicks range in price from $2845 for the LeSabre two-door sedan to $3795 for the Electra 225 four-door hardtop. These are list prices at the factory and do not include taxes or destination, delivery and handling charges.

The new Buick, model by model, carries a factory list price slightly higher than 1958. The highest priced Electra 225 is nearly $500 less than last year's big Limited four-door hardtop, but it cannot be called a comparable model.

The labels are designed to help the customer understand the price structure of the car he is looking at, but the final sale price will remain a matter of bargaining between customer and dealer.

British Firm Introduces "Flat" Diesel Power Plant

F. Perkins Ltd. of Peterborough, England, has introduced a "flat" four-cylinder Diesel engine intended for underfloor mounting, a radical departure from the company's traditional vertical design.

The new engine, known as the C.305 (see illustration), has its bores inclined at 24 degrees above horizontal and develops 87 hp at 2400 rpm with a maximum torque of 216 lb/ft at 1300. The 3.6-in. bore and 5-in. stroke give a displacement of 305.3 cu in. Compression ratio is 17.4 to 1.

The compact power plant features a high-level camshaft operating the mushroom-type tappets, thus eliminating the use of pushrods. The camshaft and distributor-type fuel pump, which incorporate a hydraulic governor, are chain-driven.

This latest Perkins model will be available in four new forward-control trucks in the 4- to 6-ton range built by the Rootes Group. Its weight (less starter and fuel filter) is 831 lb, and it is 37¼ in. long, 34 in. wide, and only 28⅝ in. high.

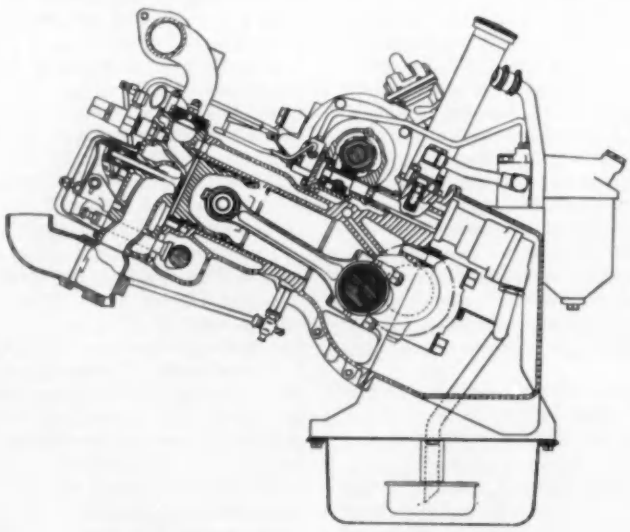
Ford of Canada Bringing Back Monarch After Year's Absence

Ford Motor Co. of Canada is bringing back the Monarch line after an absence of one year to strengthen the company's medium-price position. The new line, called the Monarch Mark II, will be sold by Ford-Edsel dealers in Canada.

Rhys M. Sale, president of Ford of Canada, says the car is new "from road to roof." The Monarch, along with the lower-priced Meteor, is styled in Canada for the Canadian market.

British Firm to Manufacture Clark Gas Turbine Engines

A manufacturing agreement has been concluded by Clark Bros. Co., a division of Dresser Industries, for the production of its large gas turbines in Britain by Armstrong Siddeley Motors, a member of the Hawker Siddeley Group. The program covers turbine units for major oil producers throughout the world, as well as prime movers for centrifugal compressors, pumps and generators for marine, mining and processing industries.



New Perkins Diesel engine is of "flat" design

Armstrong Siddeley has also linked up with Beaver Precision Products of Detroit for the exchange of technical information and manufacturing techniques related to Beaver ball screws, ways and splines. Beaver Products Division, to be set up in England, will give the American company direct access to European markets for its components that are used extensively as actuating mechanisms in missiles, aircraft, machine tools and instruments.

Buick arm rests showing inset for ash tray. Foam, which adheres to the vinyl covering, is poured in through back depicted here.

One-Piece Arm Rests Are Molded Of Urethane Foam for 1959 Cars

The Davidson Rubber Co. of Charlestown, Mass., announced it has started making parts from urethane foam.

The first urethane foam products being turned out by Davidson are fully molded arm rests (see illsutration) and sun visors for 1959 passenger cars. This marks the first time that automotive arm rests have been molded in one piece, Davidson said.

Molded into a covering of vinyl plastic, the one-piece urethane foam arm rests replace on the 1959 Buick and one of the low-priced Big Three cars older units using a number of separate parts, all of which had to be assembled. Aside from the manufacturing economies afforded by the one-piece arm rest, the greater shock-absorbent qualities of the urethane foam are said to provide a decided safety factor.

The process for the molded arm rests was developed by Davidson. The company plans to expand its use of urethane foam into other parts as the technology for making these parts progresses. Du Pont Co., a major supplier of "Hylene" organic isocyanates used in making urethane foams, is cooperating with Davidson in this development work.

AI TABLOID

Defense planners are eyeing pure beryllium as the answer for missile nose cones and leading edges and skins for high-speed planes. It has the high-temperature resistance (1500 C) and strength needed, but the problem is still brittleness. At least one contract for research into solving forming and machining problems has been let by the military, and some missile nose cones are reportedly now being produced.

* * *

Eastman Kodak Co. became the newest entrant in the field of polypropylene plastics with the announcement that it has placed a new type of polypropylene in pilot-plant production at Longview, Tex. Key to the new process, which was invented by research scientists of Tennessee Eastman Co., was the discovery of new catalysts, the company said.

* * *

Naugatuck Chemical Div. of U. S. Rubber Co. began commercial production of a new polyester plastic, called Vibrin 136A, that it says can withstand a sustained temperature of 500 F and a peak load of 1000 F for short periods of time. The new material, which is designed primarily for reinforced plastic applications, was developed jointly by Boeing Airplane Co. and Naugatuck Chemical.

* * *

Triplex Safety Glass Co., Ltd., a British manufacturer, has introduced an anti-demisting device for use in rear car windows. Microscopically thin wires are embedded in a pane of laminated glass and heated electrically by a heating element connected to the car's battery.

* * *

An anti-skid device that permits maximum braking and at the same time prevents wheel lock and resultant skidding has been developed by a British firm from anti-skid equipment now in use on aircraft. The unit, which is interposed between the brake pedal and the brake, relays the effort applied by the driver and immediately relieves the pressure in the brakes when an increase in wheel deceleration gives warning of impending wheel skid.

Beryllium Corp. has installed new facilities at its Reading, Pa., plant for the production of hot pressed and machined beryllium oxide shapes for use in the aircraft, missiles, and electronics industries. Machining is accomplished by means of diamond-tipped machine tools—pre-set or remotely controlled—operating in closed air systems.

* * *

Acme Precision Products, Inc., has completed acquisition of Cal-Tronis, Inc., Los Angeles electronics firm, with which it has had a working agreement since September, 1956. The acquisition, the company said, will give Acme direct entrance into the guided missile field, including test equipment and components.

* * *

International B. F. Goodrich Co. plans to build a new plant in Campinas, Brazil, to manufacture tires, tubes, plastics, and industrial rubber products for the automotive industry and the replacement market. Production is slated to begin late next year.

* * *

Chromalloy Corp. acquired Propellex Chemical Corp. of Edwardsville, Ill., producer of missile and rocket components and other equipment, and will operate it as the Propellex Chemical Div.

* * *

Minneapolis-Moline Co. sold its Moline, Ill., manufacturing plant to Deere & Co. and is now concentrating its manufacturing operations in Minneapolis, Minn.

* * *

The de Havilland Engine Co. Ltd. of Leavesden, England developed a new 1000 shp turboprop engine, which is available in both single and coupled forms. In the coupled version, two engines are arranged to drive a single output shaft and, when required, one of the power units can be disengaged to achieve greater fuel economy.

* * *

Raytheon Manufacturing Co. is building a $1.7 million flight test facility at Bedford, Mass., to speed development of missile and aircraft electronic equipment. The new 70,000-sq-ft structure is scheduled for completion early next year.

AVIATION MANUFACTURING

SAUNDERS-ROE P.531 IS GENERAL-PURPOSE HELICOPTER

Saunders-Roe P.531, latest British entry in the rotary wing field, is a five seat-general purpose helicopter powered by a Blackburn Turmo "600 Series" free-turbine engine of 425 shp. The P.531 was designed and built as a private venture at the company's Helicopter Div. of Southampton Airport, Eastleigh. Cruising speed is 100 knots and maximum endurance 5.2 hours. New helicopter can be fitted with hoist for rescue operations. Gross weight is 3800 lb.

1.5 Million Lb Thrust Rocket Called Possibility in Year

A Rocketdyne spokesman admitted recently that it is "conceivable" that a 1.5 million lb thrust rocket engine now under development could be tested within one year.

In Detroit for the American Rocket Society meeting, Roy Healy said the new engine will be built from existing components of Thor and Jupiter engines. Healy directs Rocketdyne's Jupiter engine project.

The 1.5 million lb thrust development contract from the Army follows two separate contracts assigned last August for development of a single-chambered million lb thrust engine and a second system with thrust of less than a million lb but more than existing engines.

Healy and George Sutton, manager of advanced design at Rocketdyne, said the 1.5 million lb thrust engine will be a liquid propellant booster. They said it could be rushed through fast because concepts of currently operative rocket motors will be used.

Work will be done at Canoga Park, Calif. The project has been labeled "high priority" by the Advanced Research Projects Agency of the Defense Department.

Rocketdyne said the new unit will consist of a cluster of currently-tested rocket motors packaged into a single unit.

Sutton and Healy said the development of a 1.5 million lb thrust engine should pave the way to propulsion units of up to 6 million lb thrust.

Bendix Gets Initial Contract For Airborne Weather System

The Systems Div. of Bendix Aviation Corp. has received an initial contract from the Air Force to design a flying weather-sensing system "to probe the atmosphere on a global scale."

Dr. Russel D. O'Neal, divisional general manager, said the contract covers the first 12 months of an estimated 36-month program for research, development, and testing of a prototype weather system.

Boeing Airplane Co. as well as six other Bendix divisions will aid in developing the new system and supply components, Dr. O'Neal said.

The airborne weather stations will consist of four-engined Air Force jets equipped with multiple radars, instrument-packed rockets, atmosphere sensing equipment and electronic computers. The stations will be in constant touch with ground stations that will process and relay weather data over a national network, Dr. O'Neal said.

The jet aircraft will make 4500-mile flights at speeds of Mach 0.95 and altitudes of 50,000 ft to measure cloud formations and look inside storms. Instrument-equipped rockets will be launched to probe the jet stream and other atmospheric phenomena at altitudes as high as 150,000 ft.

Dr. O'Neal said the new system is intended primarily for the Air Force's Air Weather Service, but that data will also be supplied to commercial airlines, the Weather Bureau, and to weather forecasting stations serving many industries, utility companies, and agriculture.

Gas Used to Lubricate Metals At 1000 F, Chemist Reports

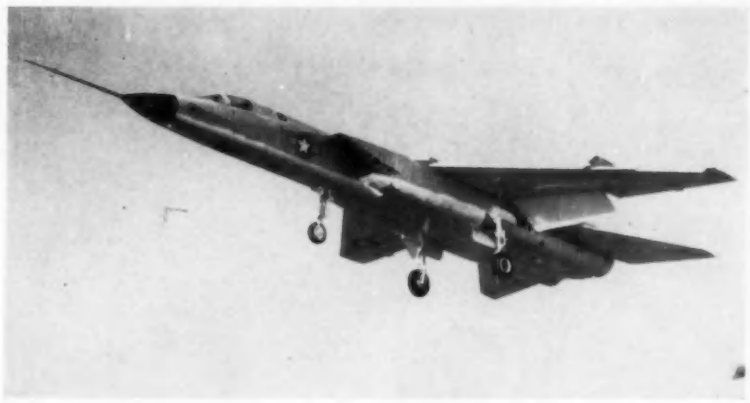
A major problem in aircraft and missile development — lubrication at temperatures of 1000 F and higher — may be solved with several gases of the Freon family, a Government chemist told the American Chemical Society's national meeting recently.

These gases, widely used as refrigerants, function by combining chemically with the metal to be lubricated and forming a film that reduces friction, according to Donald H. Buckley, a lubrication research engineer of the Lewis Flight Propulsion Laboratory.

Mr. Buckley reported that certain nickel and cobalt alloys were effectively lubricated by Freon-12 and other gases which are close chemical relatives.

The Freon gases were tried because they were known to be able to withstand temperatures as high as 1000 F, Mr. Buckley explained, but when metals slide together frictional heat may produce temperatures at point of contact as high as 1100 F. The lubricating gas decomposes at these hot spots, he added, and "active atoms thus released react with the metal to form compounds capable of effective lubrication." Thus the lubricants are continuously reformed as needed.

Gases containing bromine atoms were found to be more effective with nickel alloys and the chlorine-con-



Navy A3J Vigilante Makes First Successful Flight

The Navy's newest supersonic attack plane, the A3J Vigilante, made its first flight recently at Columbus, Ohio.

The carrier-based, two-place Vigilante was developed and is being produced by the Columbus Div. of North American Aviation, Inc.

The A3J is powered by two General Electric J-79 turbojet engines, each developing 15,000-lb thrust.

The plane is designed to carry both conventional bombs or nuclear weapons, including air-to-surface missiles. It can also be equipped with a "buddy tanker" refueling package to enable it to function as a tanker to refuel other strike aircraft.

A unique feature of the Vigilante is its method of bomb delivery. Bombs are ejected out of the tail from a "linear" bomb bay. This is, in effect, a tunnel running lengthwise in the aft section of the fuselage.

taining gases with cobalt alloys, the chemist stated. The best combinations, he said, gave friction coefficients as low as 0.05 without excessive wear.

Details of A3D-2P Revealed After Plane's First Flight

A new Navy photo reconnaissance aircraft, the A3D-2P, has made its first flight and is now undergoing testing at Edwards Air Force Base, according to Douglas Aircraft Co.

The twin-jet, carrier-based plane is a new version of the Douglas A3D Skywarrior, with a completely redesigned fuselage, cockpit, and wings. Major features include pressurized and heated crew and camera compartments and a unique master control panel in the cockpit, which permits single or multiple operation of all cameras by the pilot or photo-navigator.

Like its bomber counterpart, the A3D-2P is powered by two Pratt and Whitney J-57 turbojet engines and includes the Westinghouse tail turret, which is equipped with twin 20 mm. cannons and automatic fire control system.

The A3D-2P has a wing span of 72.5 ft, length of 75.5 ft, and height of 28.8 ft. Both its swept wings and vertical stabilizer fold for carrier operations.

Lockheed to Produce Missile Ground Support Equipment

Lockheed Aircraft Corp. announced that its Georgia Div. has established a special products branch to design, develop, and produce ground support equipment for missiles and aircraft.

The company said the new branch will produce special purpose trailers, containers, pallets, dollies, and other ground support equipment, and will also do subcontract work for other companies on sub-assembly aircraft and missile structures.

William B. Rieke was named manager of the new Special Products branch; R. E. Fitzwilson, sales manager; and Frank B. Johnson, products engineer.

Douglas Awarded Contract for Plane Cargo Handling System

Douglas Aircraft Co.'s Long Beach Div. received Air Force contracts for development of a standardized aircraft cargo handling system that will load a plane in one-twelfth the time now required by more conventional methods.

The new system, according to Douglas, will be capable of off-loading 90,000 lb of cargo from a Douglas Cargomaster and reloading it in about 30 minutes.

One contract covers the design and fabrication of a set of track structures, 53 cargo pallets, and 33 cargo cages. The pallets, 7 by 10 ft, will be made of aluminum with paper honeycomb core developed by Douglas.

The new system will use roller conveyors identical to those used in C-133A aircraft. Side guide rails will permit latching of the pallets securely in place prior to loading.

A second contract calls for a study to adapt the system to aircraft with high cargo floors, such as the C-54, C-97, C-118, C-121, C-124, KC-135, DC-8, and Civil Reserve Air Fleet planes.

"This system reduces cargo handling time to that required for refueling the aircraft," said K. G. Farrar, vice-president-general manager of the Long Beach Div.

ELECTRIC HELICOPTER

An electrically powered version of Kaman Aircraft Corp.'s radio-controlled pilotless helicopter has made its first flight at the company's Bloomfield, Conn., plant. The piston engine has been replaced with a lightweight high-voltage a-c motor, which gets its power through a cable from a 250 KW gas turbine driven generator on the ground. Kaman developed the aircraft under contract with Navy Bureau of Aeronautics and lists as major advantage its capability for long-duration flight over one location.

MEN IN THE NEWS

Cincinnati Milling Machine Co., Machine Tool Div.—Albert H. Dall was appointed chief engineer.

Fairchild Engine and Airplane Corp.—James H. Carmichael was elected a corporate vice-president, and R. James Pfeiffer has been promoted to vice-president—marketing in the new Commercial Transport Div.

Vickers Inc., Mobile Hydraulic Div.—John H. Baer has been named sales manager-administrative.

Fisher Body Div., General Motors Corp. — **Carl W. Moyer** was named general factory manager of Fisher plants in the Eastern States assembling Chevrolet bodies; **Ralph R. Nordyke,** factory manager of Michigan assembly plants; **Frederick H. Hanson,** general factory manager of Fisher plants in the Western States assembling Chevrolet bodies; **William Dornan,** director of facilities planning and works engineering; and **Robert H. Gathman,** general manufacturing manager.

Lindberg Industrial Corp.—**William Darrah** has become vice-president of the newly created Continental Div.

Phoenix Manufacturing Co.—**Henry L. Carlton** was named vice-president-sales and **Leonard C. Pietsch** vice-president-planning.

Dow Chemical Co.—**G. J. Williams** was named sales manager of the Plastics Department.

General Electric Co., Chemical & Metallurgical Div. — **Dr. A. Eugene Schubert,** has been appointed general manager of the Chemical Materials Department, succeeding Sam L. Brous, who has been named marketing manager.

Pratt & Whitney Co.—**Alford H. Johnson** was appointed sales manager for the Cutting Tool and Gage Div.

B. F. Goodrich Canada Ltd.—**Ira G. Needles** was elected chairman of the board.

Clark Equipment International, C. A., Construction Machinery Div.—**C. W. Massie** has become general manager.

Donaldson Co., Inc. — **Arthur C. Cragg** has been appointed sales manager-distributor sales.

Crucible Steel Co. of America, Metallurgy Div.—**E. T. Walton,** has been named manager - customer technical services, and **James A. Kearney** has been appointed manager - materials and processes.

Pangborn Corp.—**A. A. Milkie** has been appointed manager of the Chicago District.

Studebaker-Packard Corp. — **A. J. Porta** has been elected executive vice-president.

Yale & Towne Mfg. Co.—**Talmadge C. Jones** has been appointed general superintendent of the Salem (Va.) Plant.

General Motors Corp.—**Kenneth S. Hedges** is now safety director.

Pontiac Motor Div., General Motors Corp. — **Benjamin A. Kissam** was named advertising manager, and **E. R. Pettengill** is now assistant general sales manager in charge of the Eastern half of the U. S.

Kaydon Engineering Corp., Frauenthal Div.—**Jay C. Gorham** has been named acting manager; **Richard Couch,** vice-president in charge of sales; and **Wm. A. Krampert,** assistant sales manager.

Jones & Laughlin Steel Corp.—**Robert B. Algie** has been appointed Chicago District Sales Manager and **Charles W. Sherman** was made technical director of the Stainless and Strip Div.

Bendix Aviation Corp., Filter Div. —**Gordon T. Grimstad** was made sales manager.

Sinclair Research Laboratories, Inc. — Walter G. Ainsley is now in charge of the newly established Detroit research office.

Tuthill Pump Co.—Michael J. McCaughey was named general sales manager.

Necrology

Joseph A. Van De Mark, 51, branch manager of the Steel Service Div. of Van Pelt Corp., died Sept. 7, at Buffalo, N. Y.

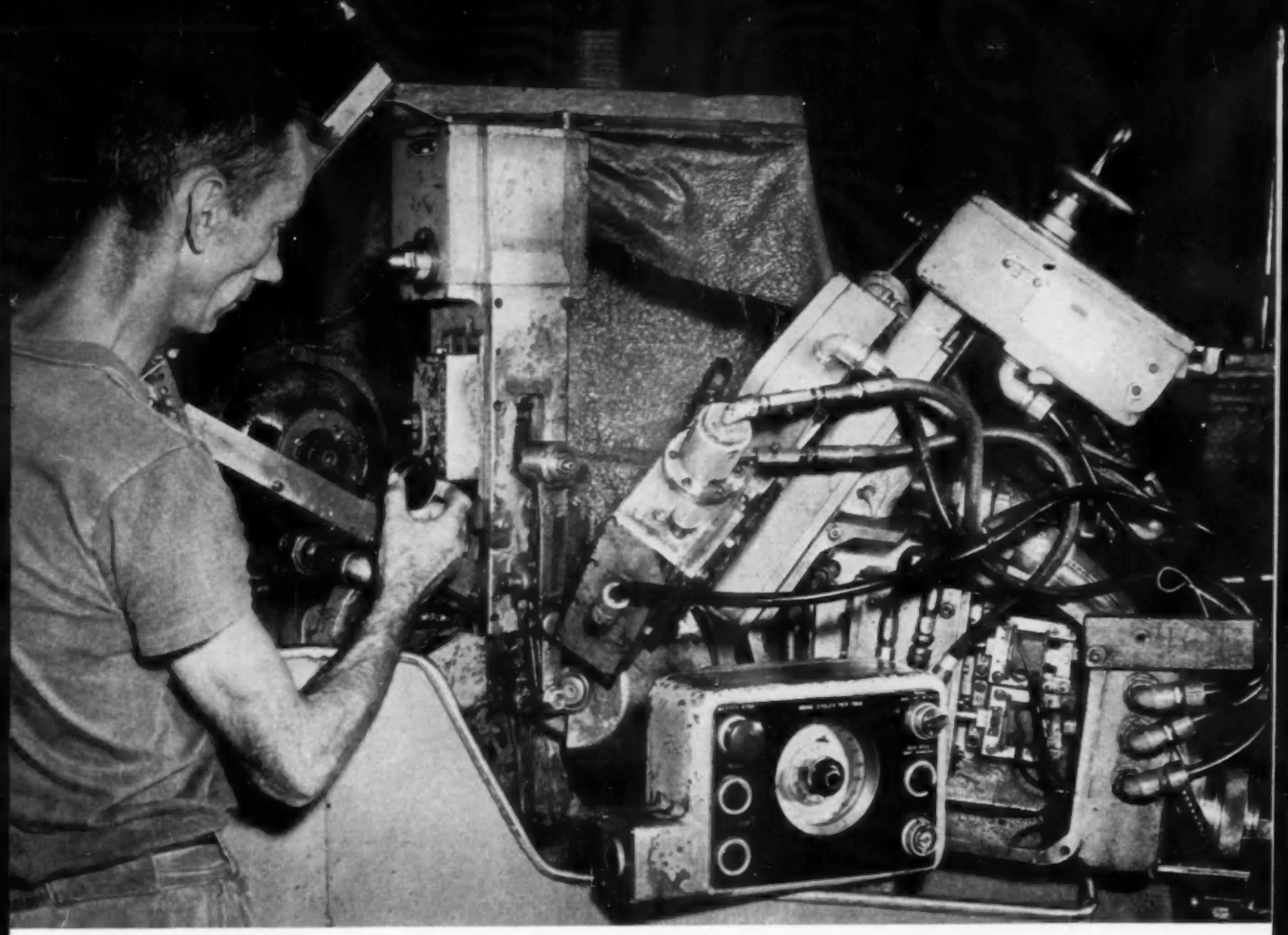
Raymond A. Schakel, manager of the Sales Engineering Dept. of Diamond Chain Co., Inc., died recently, at Indianapolis, Ind.

Carl A. Otto, 62, vice-president in charge of engineering and research at Johnson Service Co., died Sept. 2, at Milwaukee, Wis.

Thomas M. Stewart, 93, a member of the board of directors and former commercial sales manager of Taylor Instrument Cos., died Sept. 2, at Rochester, N. Y.

Edward A. Cowles, 88, founder and retired president of Cowles Tool Co., died Aug. 26, at Cleveland, O.

Earl L. Hauman, 64, vice-president and general manager of Exolon Co., died Aug. 26.



bearing life boosted from

THREE WEEKS TO FOUR YEARS

with Texaco Cleartex Oil

Tyson Bearing Corp., Division of SKF Industries, Massillon, Ohio, extended the life of micro-centric grinder bronze sleeve bearings from 3 weeks to 4 years (and they're still going strong) using *one* oil—Texaco Cleartex B—for both grinding *and* machine lubrication.

Before Cleartex was used, machine bearings would fail in about 3 weeks, because the lubricant became contaminated by grinding oil. With Cleartex this problem simply doesn't exist. A premium quality lubricant, Cleartex is *also* a fine grinding oil. In fact, Tyson now gets as many as 20 pieces per wheel dressing, each with a better finish, compared to the 10 or 12 that were previously obtained.

You can do any machining work better, faster and at lower cost with Texaco—a complete line of cutting, grinding and soluble oils. A Texaco Lubrication Engineer will gladly help you select the right ones for your job. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write: The Texas Company, 135 East 42nd Street, New York 17, N. Y.

LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

(PARTS, INVENTORY, PRODUCTION, DOWNTIME, MAINTENANCE)

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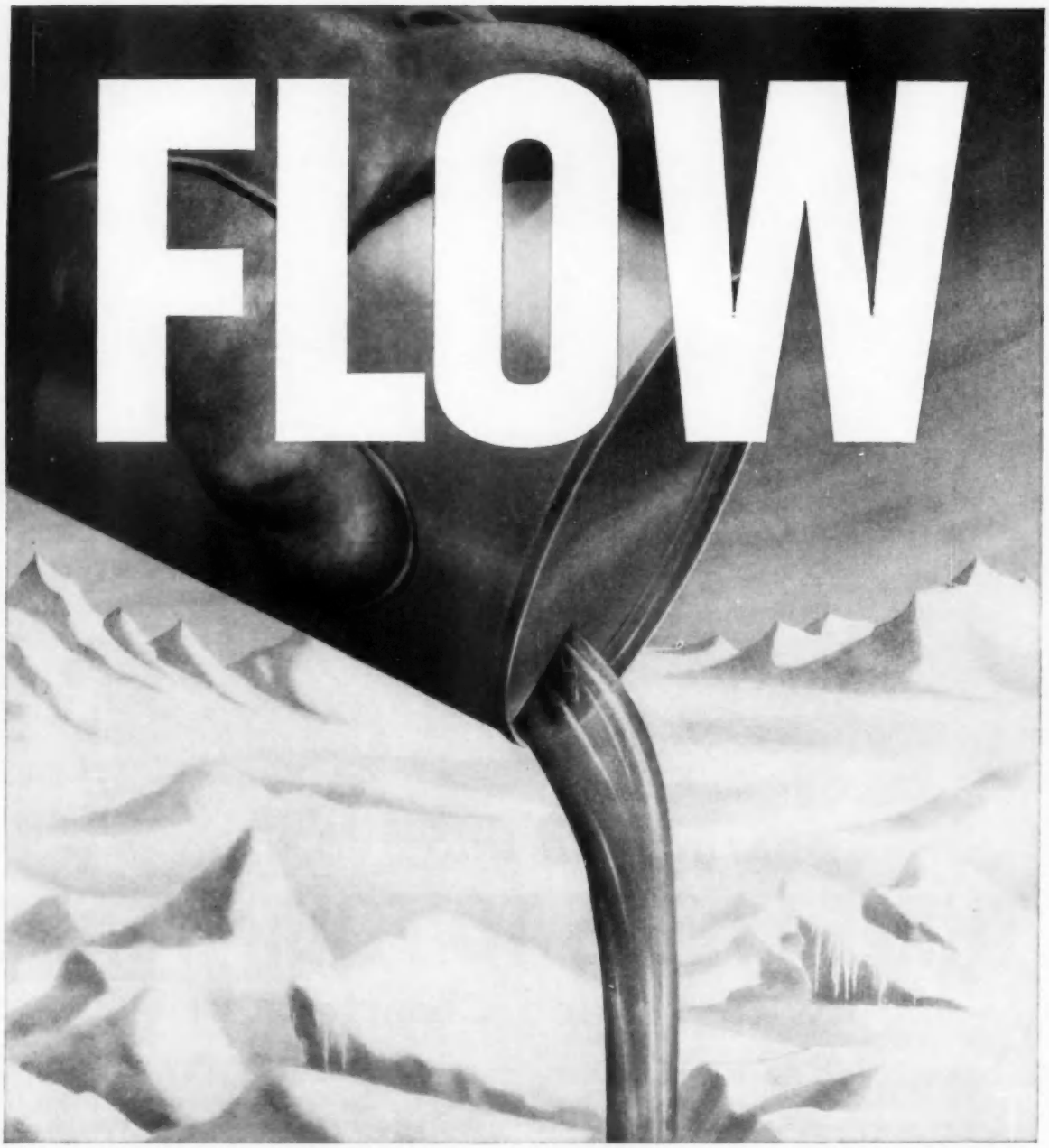

PARAFLOW-BLENDED OILS FLOW AT SUB-ZERO TEMPERATURES!

Ice and blizzard winds—even at temperatures as low as those in sub-zero polar climates—can not stop *Paraflow*®-blended oils from flowing. Paraflow-blended oils guarantee instant lubrication when the engine is started . . . provide smooth, efficient flow, give higher rates of circulation to all engine parts during crucial warm-up periods. Paraflow is economical; it avoids severe, harmful dewaxing, and just 1% can lower an oil's pour point as much as 60°!

Enjay has developed the *only complete line* of high quality additives (Paramins®). To meet the most exacting lubrication specifications, insist on Enjay Paramins.

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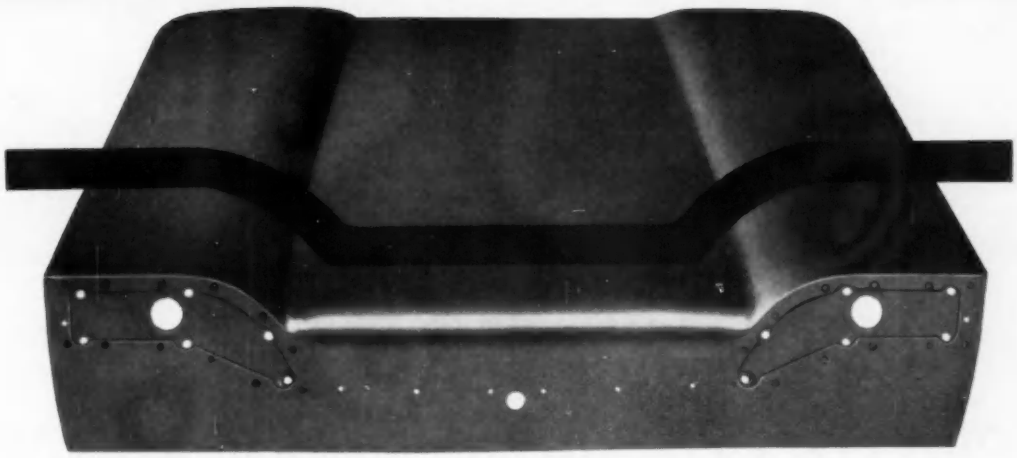
Inland "Job-Tailored"
cold rolled sheets work better

product: AUTOMOBILE TRUNK LID



problem:

An automobile manufacturer was having difficulty finding a steel sheet that would take the severe fabricating required to make the trunk lid of a new model. The part called for a tough draw, and the metal flow was very restricted. Finish of the steel was also an important factor. No one could provide a steel sheet that would do the job without excessive breakage.

solution:

Inland came up with a special Drawing Quality Killed Steel, "job-tailored" for this part. The steel took the difficult fabricating operation... solved the problem... and permitted the manufacturer to get his new model automobile out on schedule.

INLAND STEEL

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At your service soon . . . Inland's new Cold Mill and a 50% increase in capacity for cold rolled sheet products.

INLAND

Cold Rolled Sheets

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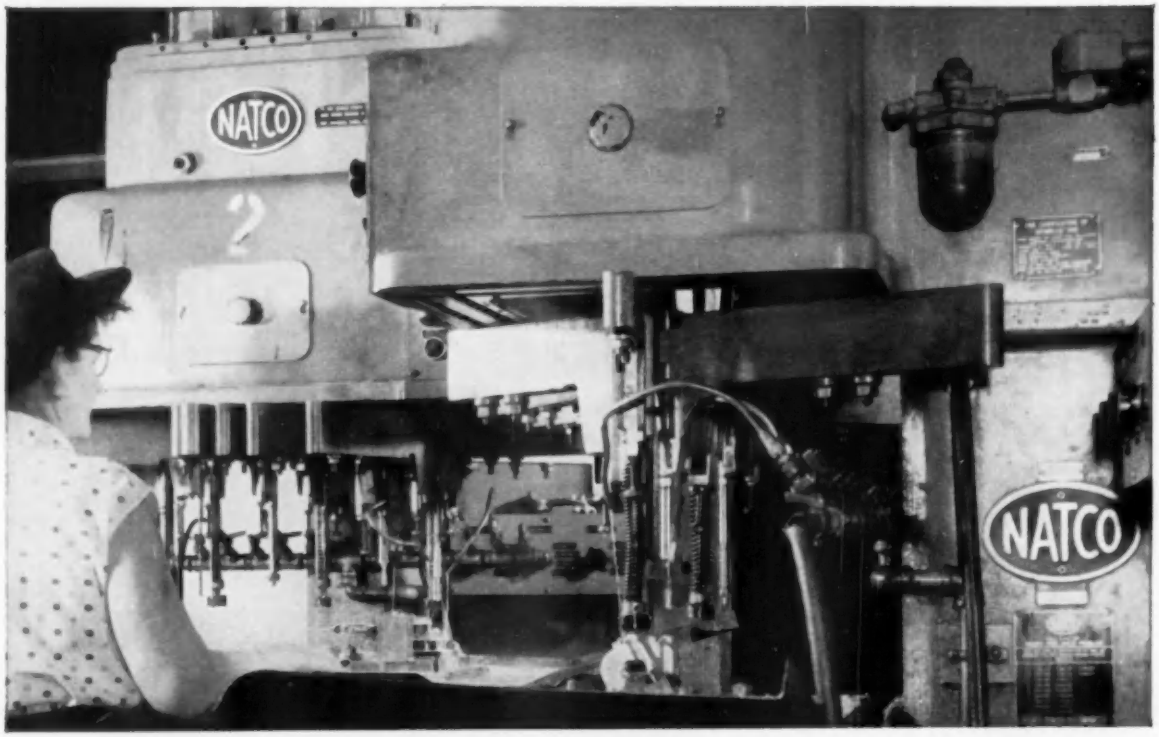


Ten Natcos like these replaced 170 single spindles!

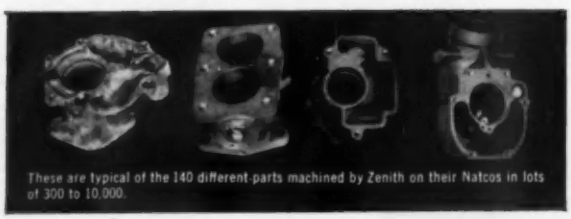
It's "reduce costs or else" in the hotly competitive carburetor business. That's why Zenith Carburetor Div. of Bendix Aviation Corp. embarked on a tooling program which resulted in substantial savings per casting machined.

Ten multiple spindle H-6 Natcos provided the greatest savings per machine dollar spent. By combining drilling and tapping operations, the Natcos eliminated the need for 170 single spindles. Look at the cost comparisons on two parts, for example—a die-cast cover and fuel bowl.

Formerly, the cover was machined by five operators using ten single spindles with ten jigs. The fuel bowl was formerly run by two operators on four single spindles using four individual jigs. Now these parts are run on two Natcos by a single operator at a direct cost savings of 81% on the cover and 70% on the fuel bowl.

Wherever hole-machining operations are performed one at a time, you'll find outstanding opportunities for cost reduction. Standard multi-spindle Natcos range from 1 hp, 10-spindle high-speed machines to giant heavy duties with 50 hp and up to 72 spindles. Natco also builds a complete line of special way-type, index and transfer machines.

A Natco field engineer can help you with your cost-reduction and production problems. Call or write today.


These are typical of the 140 different parts machined by Zenith on their Natcos in lots of 300 to 10,000.

Somewhere in Natco's experience is a money-saving idea for YOU!

NATIONAL AUTOMATIC TOOL COMPANY, INC.

Richmond, Indiana

Natco offices in Chicago, Detroit, New York, Buffalo, Boston, Philadelphia, Cleveland and Los Angeles; distributors in other cities.

NATCO

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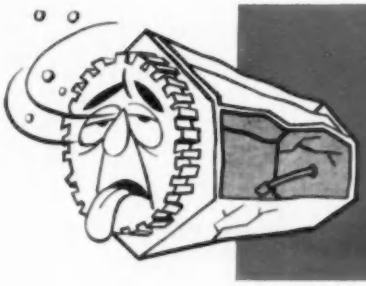


"DON'T GET CAUGHT WITH YOUR PLANTS DOWN!"

Have UDYLITE *repair, replace plating barrels NOW...at low cost!*

Get ready today for tomorrow's upswing in business! Have your plating facilities geared to peak performance . . . avoid the risk of costly down time during peak periods of production. Take inventory of your equipment needs . . . and the condition of your plating barrel equipment. Then let your Udylite sales engineer give you on-the-job quotations for repairs or replacements. When your equipment is sent to Udylite . . . you are guaranteed a definite return delivery date. A special department handles your order all the way through . . . costly down time is kept to an absolute minimum.

REPAIRS OR REPLACEMENTS BY UDYLITE OFFER THESE ADVANTAGES:

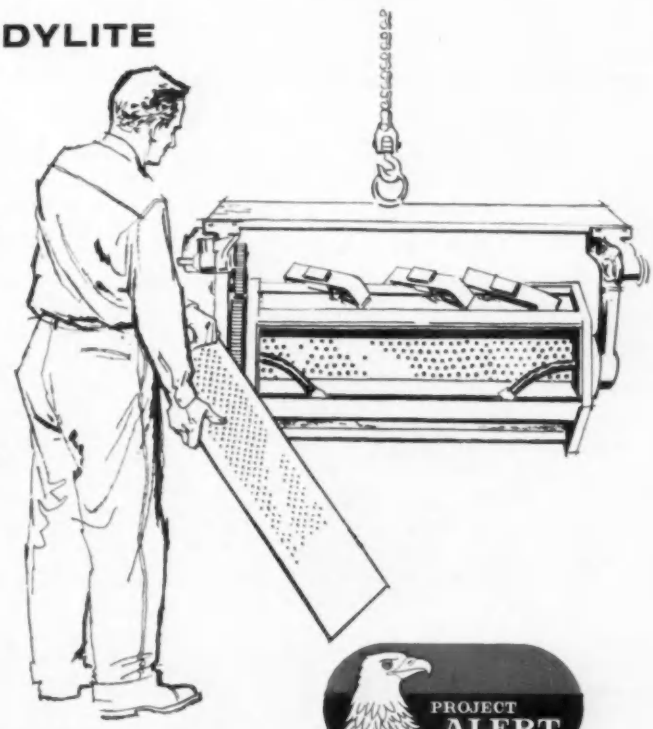
1 IMMEDIATE QUOTATIONS given by Udylite salesman right in your shop!

2 ALL REPAIRS or REPLACEMENTS WITH GENUINE UDYLITE PARTS! You're assured of finest Udylite engineering, highest quality!

3 PARTS FACTORY INSTALLED by trained barrel equipment specialists.

4 FAST, GUARANTEED DELIVERY of equipment sent to Udylite. Special department set up to expedite your order.

Let Udylite help you get your entire plating operation in top working order, ready to go at top capacity. Your Udylite sales engineer will soon be calling on you. But if you need priority service write, phone or wire directly to:



PROJECT ALERT

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Design and Operation of

Saginaw Power Steering Gear for 1959 Cars

THE new rotary valve type, integral power steering gear developed for 1959 cars by the Saginaw Gear Division, GMC, is said to meet the objectives visualized for many years, i.e., to combine the positive response of the manual gear with the smoothness and lightness of a power gear.

Foreshadowing the current product, Saginaw engineers had established the following design objectives:

1. Instantaneous hydraulic response.
2. Light steering effort without loss of proportional road feel.
3. Elimination of hydraulic transition feel.
4. Improved returnability.
5. Prevention of loss of on-center steering adjustment.
6. Reduced in number of external seals.
7. Reduction in size, weight, and number of parts.

How well these objectives have been realized may be visualized from the following description of the new gear, referring to Fig. 1. The mechanical portion, comprised of the pitman shaft sector gear and the worm and rack-piston assembly, is similar to the former gear although simplified in detail. The major difference is found in the valve mechanism which now functions by rotary motion. The worm assembly is fixed endwise by thrust

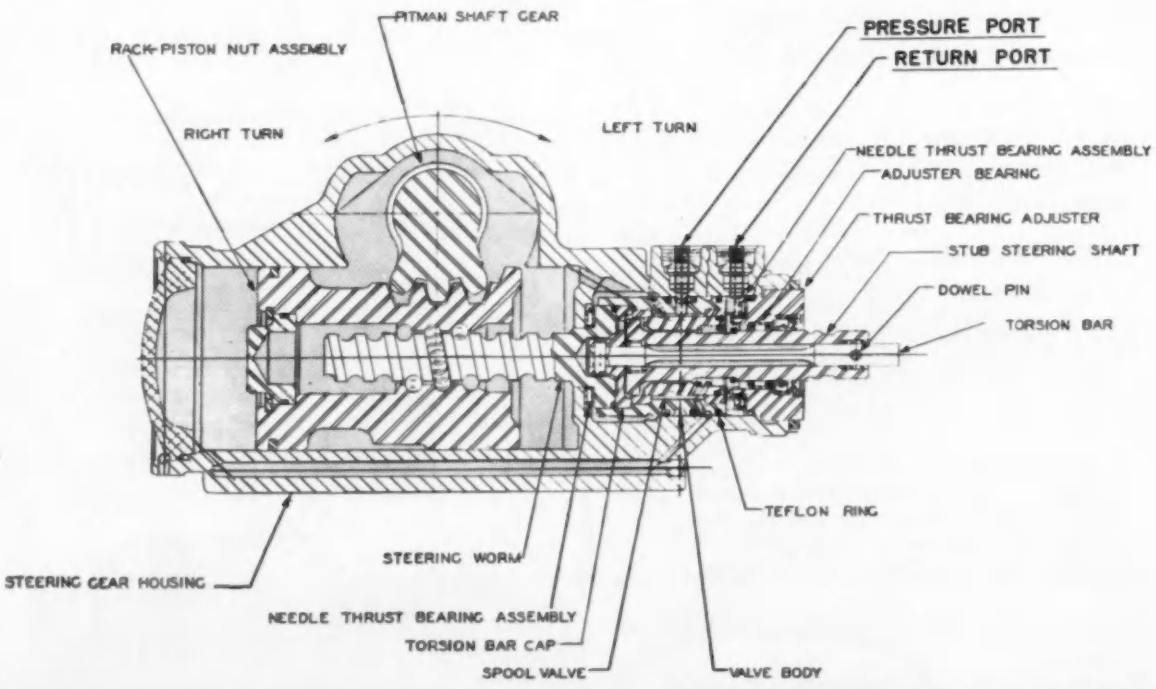


Fig. 1—Cross-section of 1959 Saginaw steering gear, showing rotary type valve and the in-line relation of components. The torsion bar for actuating the valve is seen at the right.

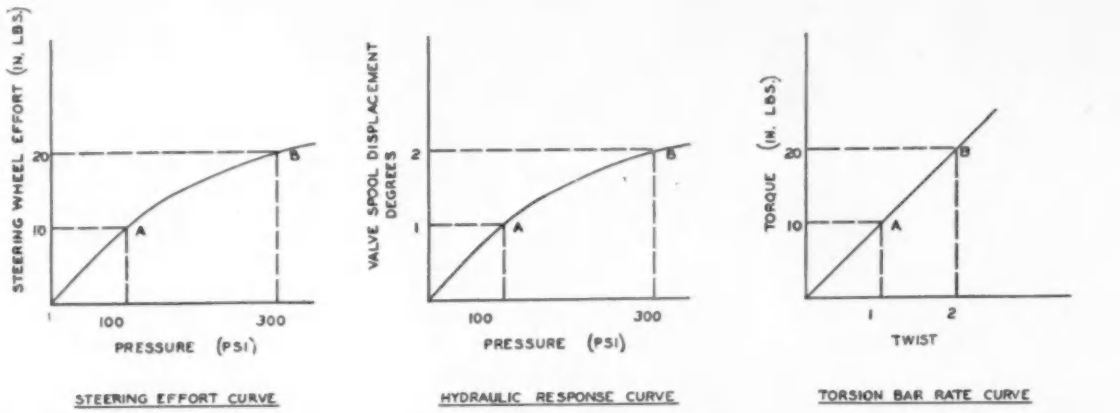


Fig. 3—Graphs plotted here indicate the method of approach in selecting the proper torsion bar for a specific application.

bearings located at the lower side of the worm shoulder and at the upper end of the valve assembly. The centering means for the valve spool is effected by means of a torsion bar, anchored at the bottom to the valve body through the cap, and to the stub steering gear shaft at the upper end by a dowel pin. The torsion bar is a simple and positive centering means, providing a centering force proportional to the angle of deflection.

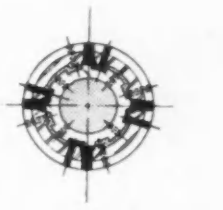
The hydraulic valve consists of a valve body and a valve spool of a conventional three-way, open-center type construction, except that the valve lands run parallel to the axis rather than around the diameter. This allows the valve to be actuated by rotation of the spool within the valve body, rather than by axial movement of the worm or through any cam-type device, resulting in much faster actuation of the valve than is possible in the former designs.

Figure 2 shows a cross section of the valve body and valve spool cut perpendicular to the centerline of the steering gear. With the valve spool in a neutral position, the valve gaps are open and the oil flows freely through the valve and back to the pump with a minimum of pressure drop. During a right turn, the valve spool is displaced clockwise within the valve body, opening the right turn valve lands to pressure oil and the left turn valve lands to return oil. During left turn, the valve spool is displaced counterclockwise within the valve body, opening the left turn valve lands to pressure oil and the right turn lands to return oil.

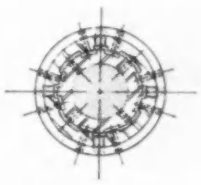
The valve body is constructed of three separate pieces, press-fitted together, and the ID finish-ground to fit the valve spool as a final operation. Three rectangular section teflon rings circle the valve body and act as annular seals for the pick-up of pressure oil and the lower cylinder oil. The upper cylinder is fed by a hole drilled between the valve bore and the OD of the valve body below the lower teflon annular seal. The return oil exists through holes drilled in the valve body and spool past the upper thrust bearing and out the return hole in the housing.

The valve spool is driven by a pin press-fitted in the stub steering shaft which engages a slot in the upper end of the valve spool. This allows for misalignment between the valve body, valve spool, and the stub steering shaft. It prevents binding of the spool and the valve body, which are selective fitted to a clearance of 0.0004 in.-0.0008 in. The torsion bar is pinned to the stub steering shaft at the upper end after adjusting the neutral position of the torsion bar to the hydraulic neutral center of the valve assembly. This adjustment is made by deflecting the torsion bar by means of the stub shaft to

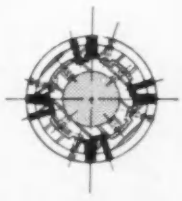
(*Turn to page 53, please*)



LEFT TURN POSITION



NEUTRAL POSITION

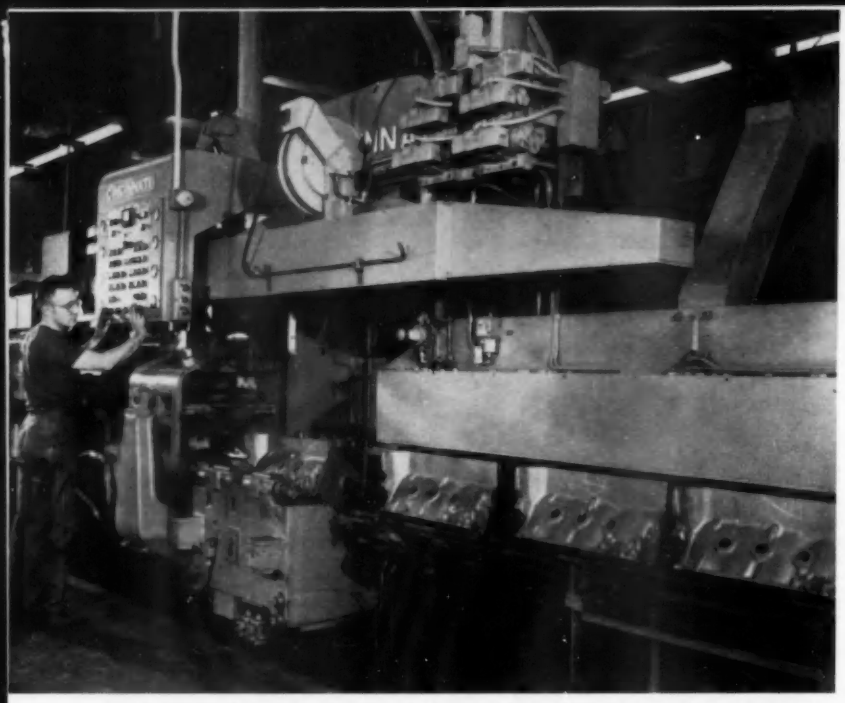


RIGHT TURN POSITION

HIGH PRESSURE OIL

LOW PRESSURE OIL

Fig. 2—Here is a transverse cross-section of the valve spool showing the flow of fluid in neutral, and right-and left-turn position.



Initial machining of engine blocks is performed by this giant Cincinnati surface broach. The block moves into the broach where it is automatically clamped in place and the banks and bottom surfaces machined in two operations. At the end of the operation, the block is automatically unclamped and moved to the next machine.

Latest Automation Techniques at

By Joseph Geschelin

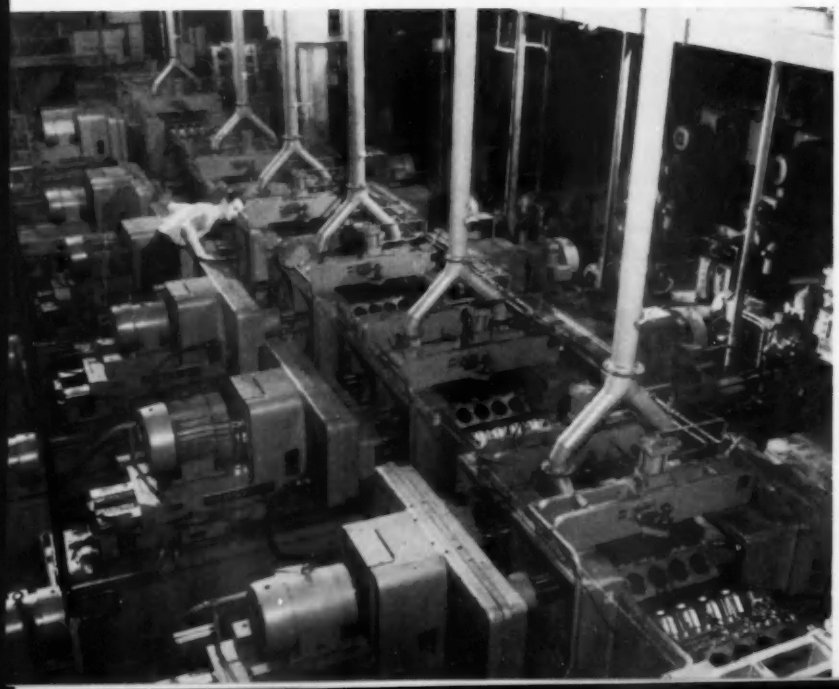
NEWEST plant in the Ford Motor Co. program to be previewed by the press is the M-E-L Division engine plant in Lima, Ohio. Not only is it the latest of the engine plants to go into production, but it represents the very maximum of automation techniques.

All machine loading and unloading is fully automatic, as is the transfer from one machine to another. The plant is replete with transfer type machines for components such as cylinder blocks, cylinder heads, intake and exhaust manifolds, etc. The most impressive feature is the crankshaft department which is fully automated to an extent that makes it a "first" in the industry.

Engine assembly is quite similar to the installations in the other Ford plants, employing the Jervis B. Webb power-and-free conveyor system. Assembled engines are routed automatically to the bank of 96 Nankervis hot test stands where they are put through a specified test schedule. While engines are going through the test schedule they are mass-balanced by means of special electronic instrumentation, employing an electric eye for scanning vibrations. The amount and location of unbalance are indicated on instrument dials and the operators simply add small weights at proper points to achieve balance.

Cincinnati horizontal surface broaching machines are found on the first operation on both the cylinder block and cylinder head lines, the head line featuring a bank of four of these enormous machines. Wilson Automation is used extensively to provide the

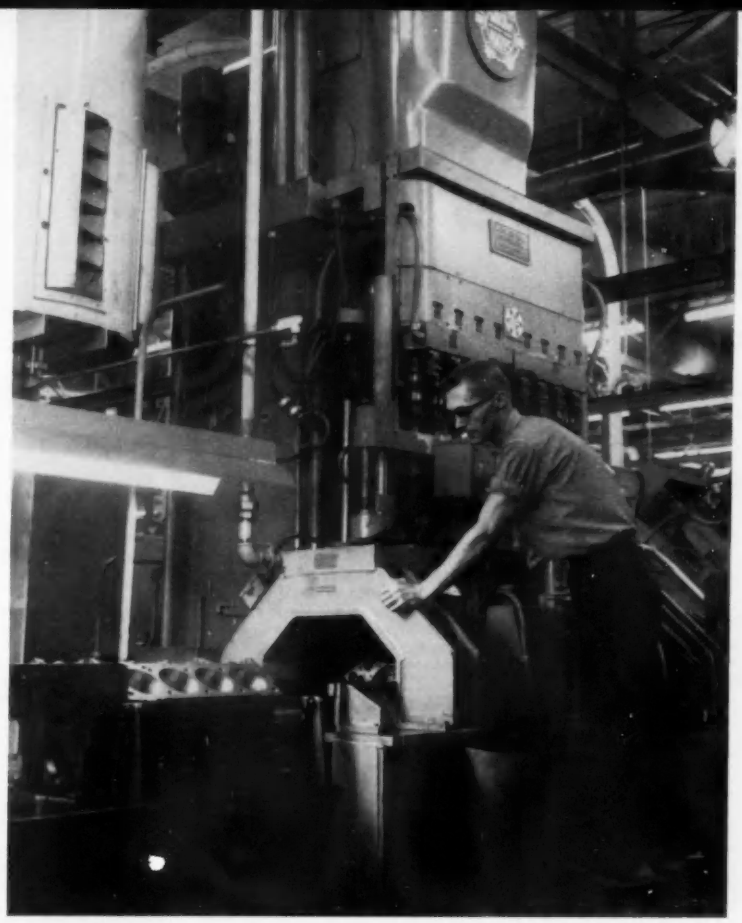
Thirty-two separate drilling and reaming operations are performed on an engine block as it passes through this 60-ft-long Cross transfer machine. Dust extracting tubes in the center remove all cast iron dust from the area.



automation serving certain machines as well as to serve as the links between transfer machines.

The cylinder head line boasts a large Footburt transfer machine provided with Wilson Automation. The intake manifold line was tooled by Buhr, while the exhaust manifold line has Snyder equipment. Large Centri-Spray washing machines are used extensively on the various machine lines.

One of the innovations on the cylinder head line is the wide use of gun drilling for many operations, particularly for valve guide holes. Gun drilling has increased tool life materially, provides better holes with a faster cycle, and speeds productivity about three times that of conventional tools. What is even more important, this



Micromatic honing machines give cylinder bores the highly-finished surface required for precision assembly. Each cylinder block is tilted to permit honing in a vertical position. The block is then transferred to the next station and the tilting action reversed so the second bank of bores also is honed vertically.

• • Continued on next page • •

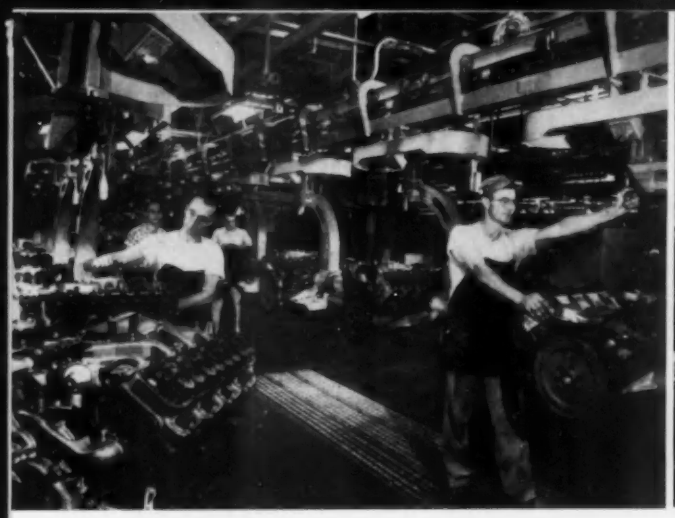
Ford's Lima Engine Plant

technique results in much better accuracy.

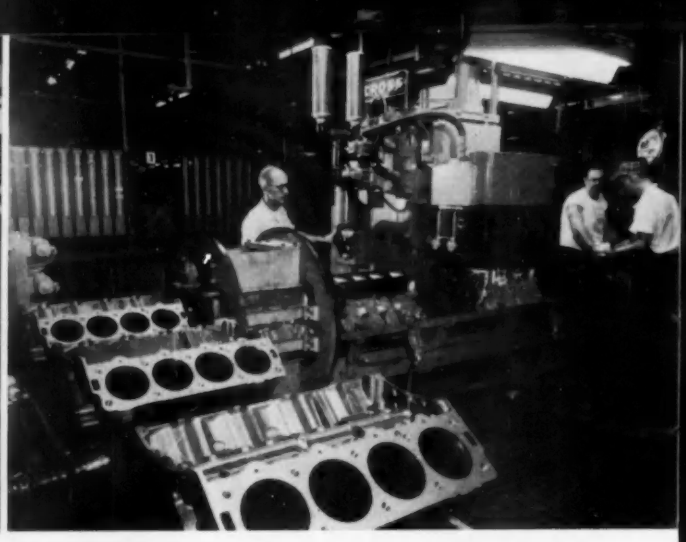
Opening of this plant to the press was recorded in the Sept. 1 issue of AI (page 58). Following publication of the present article, another installment will describe the fully automated crankshaft department and the method of producing piston pins by extrusion.

Supplementing this brief summary is a group of illustrations showing selected operations.

This completely automatic Footburt transfer machine drills, mills and reams cylinder heads. It performs 63 different operations as the head automatically moves down the length of the machine



Engine assembly operations are facilitated by use of overhead steel arms suspended from the Jervis B. Webb power-and-free conveyor system which permit employes to move the heavy engines into desired positions with a twist of the wrist. The plant has two identical lines. Engines are attached to the carrier at the start of assembly operations and remain on the steel arms through all assembly, testing and repair operations. They are removed from the carrier in the shipping area.



An automatic machine was developed by Cross to remove the main bearing bolts from an engine block at the start of assembly operations. A slat conveyor automatically positions the block enabling employes to add the camshaft, crankshaft and main bearings while the block is stationary.

Ford's Lima Engine Plant

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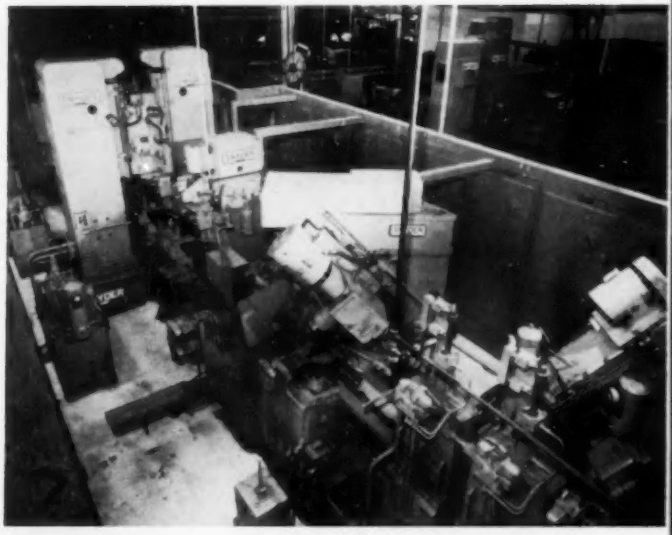
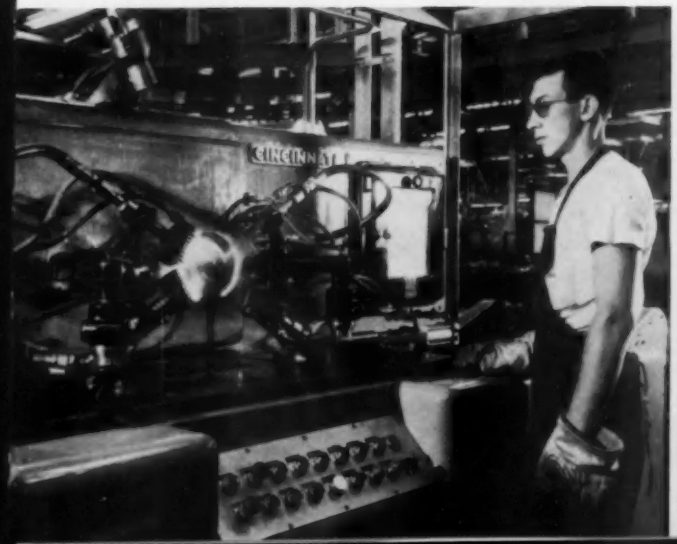
At right, various drilling, milling and tapping operations are performed on the exhaust manifold as it passes through the 28 stations of this Snyder transfer machine.



Flame-throwing principles have been adopted to speed metal hardening. This Cincinnati Flamatic unit is used to harden the camshaft sprocket. As the gear is revolved, the flame jets harden the teeth to a very close tolerance. The part is then automatically ejected into an oil bath where it is quickly quenched. Similar equipment is employed for hardening rockerarm pads and rocker shafts.

Precision machining of small parts plays an important role in the overall production of Edsel, Mercury, Lincoln and Continental engines. Sixteen drilling and reaming operations are handled by this automatic Natco machine as rocker arms are moved through the various stations.



Cadillac Series Sixty-Two six-window sedan

New Cadillacs Have Larger Engines

THE 1959 Cadillac line consists of six series of cars; five standard series (60, 62, 63, 64 and 67) which feature twelve body styles and one custom series (Eldorado Brougham) with one body style. The Eldorado Brougham is not being announced with the regular line of cars. It will be presented however, in the very near future.

Two power plants are offered; a 345 hp engine in the Eldorado Biarritz, Seville and Brougham, and a 325 hp engine in all other models. The 345 hp engine may be had as an option in these other models. Both engines have a piston displacement of 390 cu in. and a compression ratio of 10.5 to 1.

Piston displacement of 390 cu in. is obtained by increasing the stroke to 3.875 in. while the bore remains at 4 in. More effective engine breathing is accomplished by streamlining the exhaust valves and enlarging the air passages in the intake manifold. The Eldorado engine is equipped with three 2-barrel carburetors.

All 1959 Cadillac cars are equipped with new shock absorbers. In these new units the problem of keeping air from mixing with the oil in the cylinder is accomplished by replacing air with Freon-12 and holding it captive in a plastic sleeve. The result is constant oil reaction in the shock absorber with improved wheel control and ride characteristics.

Another engineering advancement, which results in perceptibly less parking effort and improved wheel response, is a new rotary valve in the power steering system. Power steering, of course, remains standard equipment along with power brakes and Hydra-Matic transmission.

Air suspension; standard on the Eldorado Brougham in 1958, becomes standard equipment on two additional models in 1959.

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Saginaw Steering Gear

(*Continued from page* 49)

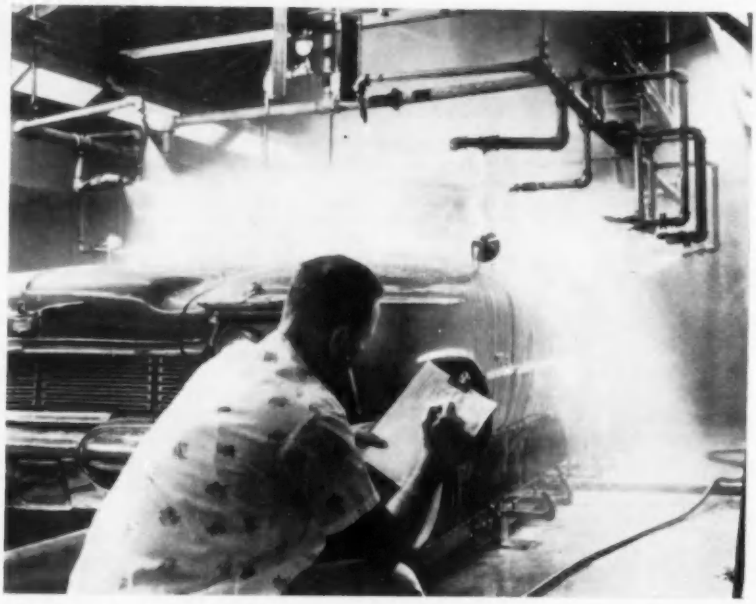
the right to build 200 psi pressure, and to the left to build the same pressure. The position of the torsion bar is then readjusted relative to the stub shaft until the effort required to deflect the torsion bar to the right and left to build 200 psi is equal within commercial limits.

The curves illustrated in Fig. 3 depict the method for determining the proper size torsion bar to obtain the desired steering effort. Referring to the curves, it can be seen that an effort of 10 lb-in. is desired to obtain a steering pressure of 100 psi; while an effort of 20 lb-in. is desired to obtain 300 psi. The curve of Pressure versus Valve Spool Displacement shows that an angular displacement of 1 deg is required to build 100 psi, and a displacement of 2 deg is required to build 300 psi. Plotting the effort for points "A" and "B" from the hydraulic response curve, results in the torsion bar rate curve which, in this example, turns out to be 10 lb-in. per degree.

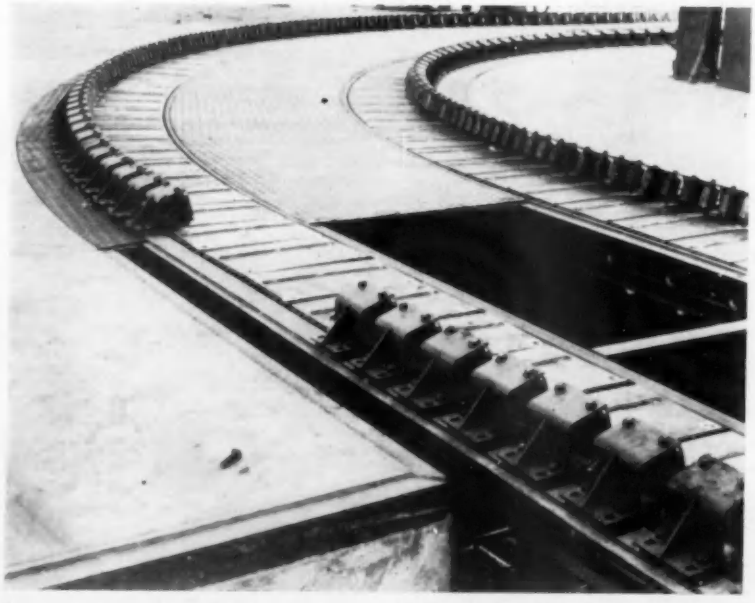
It may be noted that the 1959 gear has six fewer external seals; 17 less parts; is 0.83 in. shorter at the upper end; and weighs one pound less than previous Saginaw gears.

In the event of hydraulic failure, manual steering is accomplished through driving tangs on the steering worm which engage slots in the stub shaft. Engagement is made after a rotation of the stub shaft of approximately eight degrees each side of neutral.

Chrysler Imperial Has Own Assembly Facilities



Water test booth on the final assembly line. Volume of water is equal in intensity to a rainstorm of 252 in. per hour.



New type high speed conveyor turn used in the plant. Roller guides hold production vehicles on the track at all times.

FOR the first time since the Chrysler Imperial was introduced in 1926, this luxury car has its own assembly facilities. As announced in previous A.I. news stories, the Imperial plant occupies facilities on Warren Ave. in Dearborn, formerly used for producing DeSoto bodies and V-8 engines. The plant has been extensively revamped in the body finishing area; and is completely new in the car assembly area where assembly lines, feeder conveyors, paint spray equipment, etc., all are completely new.

Production began about the middle of August on Imperial, Crown Imperial, and Imperial LeBaron cars at the rate of 27 an hour. Production in this plant will be under the control of a separate manufacturing staff headed by G. T. Poirier, formerly general manufacturing manager, Chrysler Jefferson plant.

Among the major features of this operation are: an advanced zone-type inspection system which requires that each stage of manufacture must pass inspection before it enters the next stage; one of the most advanced statistical quality control systems to be found in the industry; the first automatic body control static switching system in the industry; and a testing procedure which includes road testing of every car.

The plant has over one-million sq ft of floor space and nearly four miles of conveyors. It has six drying ovens totaling 1928 ft. For painting they have 52,320 ft of paint pressure lines. It may be noted that the paint shop area is basically the same as it was laid out originally for DeSoto bodies, featuring the first power-and-free conveyor system for the automatic handling and switching of bodies. However, all of the equipment was torn down, cleaned and renovated. In addition, the spacing of bodies has been changed due to the fact that the Imperial bodies will go through complete with front end sheet metal and trunk lids.

Innovations featured in the new layout include a special water test located on the final line. The booth is 25 ft long, equipped with 118 jet

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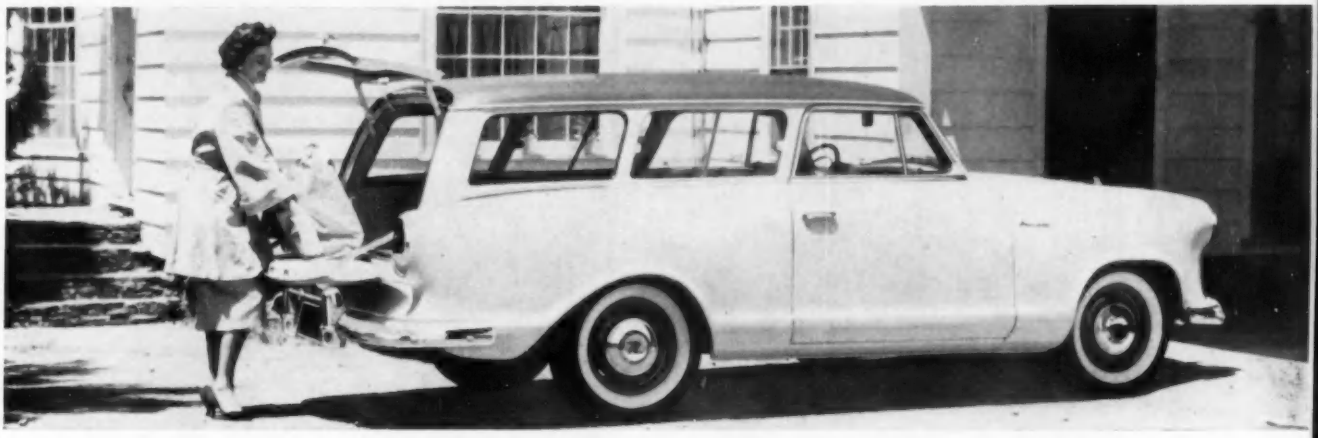

The new Rambler American station wagon

Station Wagon Added To Rambler American Line

AMERICAN MOTORS will add a new station wagon to its 1959 Rambler American line. The five-passenger, two door 1959 sedan is continued. The new station wagon model is highlighted by a low silhouette, with an overall height of 57.80 in.

On the American sedan model, a continental tire carrier is being offered as optional factory installed equipment.

The cargo compartment of the station wagon model provides a carrying capacity of 52 cu ft with the seat down. To attain full cargo capacity, the rear seat back is folded down on top of the rear seat cushion and is secured with straps.

The powerplant of both models is the same six-cylinder, L-head engine developing 90 hp, with compression ratio of 8.0 to 1. It has a displacement of 195.6 cu in. Engine is designed to operate efficiently on regular grade gasoline.

The American is still the only small car offered in this country with automatic transmission available as optional equipment. Standard transmission and optional overdrive also are available on both models.

Tailpipes for the new Americans are made of welded-seam steel tubing that has been specially processed with aluminized coating. The mufflers also have been improved with aluminized and zinc coating processes.

Brake lining thickness has been increased and, for the first time, self-adjusting brakes are offered as factory installed extra cost options.

The new models are 178.32 in. long and 73 in. wide. Both cars have a turning diameter of 36 ft.

Bodies on both American models are put through a "deep-dip" rust proofing process pioneered by American Motors, resulting in longer body life. The process involves submerging the body in a rust-proofing primer which coats the car's metal surfaces both inside and outside. ■

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Automobile Industry Spending $5 Million a Year on Safety

Contrary to current claims of ax-grinding critics, the automobile industry is taking sincere steps to increase vehicle and highway safety. And proof of this is a yearly expenditure by vehicle manufacturers of more than $5 million on engineering research in areas of vehicle safety.

Andrew A. Kucher, Ford's vice president-engineering and research, recently gave an accounting of industry safety spending to the American Association of Motor Vehicle Administrators, meeting in San Francisco.

A typical company safety budget, he said, might be broken down as follows: one-third for passenger packaging, one-third for control safety, and one-third for such projects as lighting and general safety equipment.

He said that brake development programs within a single company cost between $200,000 and $250,000 a year, with control and stability studies often taking up to 30 per cent of a company's safety research budget.

AMA Grants $200,000 For Highway Research

Two recent grants from the Automobile Manufacturers Association for safety and highway research totaled $200,000. To Cornell University's program of crash injury research went $150,000 for continued study of actual crash fatalities and injuries. AMA has granted $1,350,000 so far this fiscal year to various automotive safety programs.

A $50,000 grant went to Texas A&M for support of the MacDonald chair of transportation.

New Ambassador hardtop sedan

The 1959 Ambassador

AMERICAN MOTORS' new 1959 Ambassador by Rambler is a compact luxury model on a 117-in. wheelbase, featuring many styling refinements and mechanical improvements.

Six models, all with four doors, are being offered: Super sedan and station wagon; Custom sedan and hardtop sedan; and Custom station wagon and hardtop station wagon.

The Ambassador's new grille features a simple, single chrome bar which extends across the full width of the grille opening, accentuated by chrome strips above and below. The combined parking lights and directional signals are integrated into the ends of the grille bar.

Front and rear bumpers have been redesigned. A recessed center section on both bumpers offers protection for license plates. The thickness of the bumpers has been increased 23 per cent.

The tail lights on the 1959 Ambassador are made of new high-visibility plastic lens. For added visibility and safety, red "Scotch-Lite" reflective material has been integrated into the vertical rear fin molding.

Individually-adjustable, reclining front seats are offered for the first time as optional extra cost equipment on all models. The front cushion is divided and the two seats are fitted with separate sets of tracks. This provides the driver and front seat passenger with individual fore-and-aft adjustment in addition to the reclining seat-back adjustment. It enables the passenger to adjust his seat to any position without affecting position of the driver's seat.

Entirely new front seat headrests are available as optional equipment, either singly or in pairs, on all models. The headrests, styled to match the color and trim of the seats, are adjustable to 10 positions.

The 1959 models equipped with automatic transmission will again feature pushbutton controls. A new starting system is employed, with the neutral and start (N/S) button combined into one. Starting is accomplished by pushing in on the neutral-start button. A vacuum lock-out system prevents starter engagement while the engine is operating.

A vacuum power assist has been incorporated into the mechanism for opening and closing of the heater door. The heater control knob has been attached to a vacuum switch which actuates a vacuum diaphragm linked directly to the heater door.

The Ambassador is powered by the same 270-hp overhead valve V-8 engine, which has a compression ratio of 9.7 to 1. It is equipped with a four-barrel Holley carburetor which incorporates refinements for better control of fuel under varying conditions.

The Ambassador is available with a standard transmission, optional overdrive, or the "Flash-O-Matic" automatic transmission. The automatic transmission engine-vacuum control system, called Telovac, has been modified for improved overall operation.

A single exhaust system is standard on all 1959 models, with a dual exhaust system available as an extra cost option. The tail pipes are made from welded-seam steel tubing that has been processed with an aluminized coating. Mufflers are improved by aluminized and zinc coated sections.

A new parking brake warning light is offered as optional equipment. The red warning light is located on the instrument panel.

Like all American Motors' cars, the Ambassador employs unitized body construction. All Ambassador

Rambler custom sedan

New Rambler Six and Rambler Rebel V-8

AMERICAN MOTORS' 1959 Rambler Six and Rambler Rebel V-8 will be offered in 11 models, including station wagons, hardtops and sedans. All are four-door models, and have a wheelbase of 108 in.

The 1959 cars retain the same overall exterior and interior dimensions as the 1958 models. The Rambler Six and Rambler Rebel V-8 sedans are less than 16 ft. long and six feet wide.

The 127-hp Six is equipped with a new Visi-Flo carburetor designed to increase fuel economy. The carburetor's glass bowl allows quick checking of float operation and of any sediment deposits. A dual-throat carburetor with oil-bath cleaner, which boosts the Rambler Six horsepower to 138, is available as optional equipment. The 215-hp Rambler Rebel V-8 has a four-barrel carburetor. Both the Six and V-8 require only regular-grade gasoline.

For 1959 mufflers have an aluminized coating on internal tubes and baffles and on the end plates, and the outer shell is zinc coated. Metal thickness for tail pipes has been increased 40 per cent and, in addition, they receive the aluminized coating. Tail pipes are formed and installed so that the welded seam is at the top to prevent moisture from collecting at a seam point. An optional dual-exhaust system is available on Rebel V-8 models.

As another new feature, head-rests for the front seats, are offered as an option. They are available singly or in pairs and are styled to match the car's upholstery. The head-rests are adjustable to 10 positions and can be removed by lifting out of sockets.

The push-button automatic transmission control system has been changed to eliminate the key-start. The starter button now is combined with the neutral button. A vacuum lock-out prevents starter engagement when the engine is operating.

Optional self-adjusting brakes will be offered on six-cylinder models in 1959, as well as on the V-8's. The automatic adjusting of these brakes is accomplished during normal driving. New on Sixes this year is a feature formerly used only on the V-8; a double-acting wheel cylinder on the rear brakes. This improves braking action in reverse gear.

On V-8 models, the front brake primary shoe width has been increased from two inches to 2½ inches, increasing total brake lining area to 167 sq in. The Six brake area is 150 sq in.

The Powr-Lok non-slip differential (V-8 only) and the Air-Coil Ride rear-suspension system continue as options for 1959. A full range of other major power assists and comfort items, including All-Season air conditioning, power windows, power steering and power brakes, continue to be offered as options on both Six and V-8 models. ■

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bodies are put through a "deep-dip" rust-proofing process pioneered by American Motors. The process involves submerging the entire body in a primer which coats both interior and exterior metal surfaces.

The Powr-Saver engine cooling fan and Powr-Lok differential are available as optional on all models.

Also offered as optional equipment are: All-Season air-conditioning; Air-Coil Ride air suspension; power brakes; power steering; self-adjusting brakes; and power windows. ■

Missiles, VTOL Aircraft and New Engines Introduced at FARNBOROUGH AIR SHOW

By David Scott
Special European Correspondent
for AUTOMOTIVE INDUSTRIES

FARNBOROUGH, ENGLAND

THIS year's Farnborough Air Show was held against a background of expanding British exports in the aviation field. Foreign sales are now running at an annual rate of over $440 million, a one-third increase over the record total for 1957.

Staged early in September by the Society of British Aircraft Constructors, the show attracted visitors from all over the world. Some 360 manufacturers had exhibits, the largest number yet. Special emphasis was given this year to vertical flight and to missiles, although new developments in jet engines and rockets were also in the limelight.

The Fairey Rotodyne, making its first public appearance, probably attracted more attention than any other aircraft at Farnborough. This unique airliner, which will be built under license in America by the Kaman Aircraft Corp. of Bloomfield, Conn., combines the vtol features of a helicopter with the forward flight of a fixed-wing turboprop.

Powerplants are a pair of Napier Eland N.El.3 3000-shp engines that initially drive the rotor by com-

With undercarriage retracted the Fairey Rotodyne can cruise at speeds in excess of the world helicopter record of 162 mph

Blackburn NA. 39 naval strike plane utilizes "area rule" design coupled with boundary layer control. The split tail cone serves as an air brake.

pressed air ducted through the hollow blades to pressure-jet units at the tips. After take-off and climb to desired altitude, power is transferred to the propellers for forward flight, when the windmilling rotor provides additional lift.

In its final form, the Rotodyne will be powered by N.El.7 engines developing 3500 shp, and will have a load capacity of 48 passengers or 9000 lb of cargo, with a maximum speed of 185 mph over a 200-mile range.

Also new to the show was the gas-turbined Bristol 192, Britain's first twin-engined military helicopter and the largest of its kind in western Europe. It is powered by a pair of Napier Gazelles each of 1300 shp, providing a maximum speed of 133 mph and a service ceiling of 13,250 ft with an all-up weight of 18,000 lb. The 24-ft cabin can hold 24 fully-armed troops or 8 to 12 stretcher cases.

Westland, the largest constructors of helicopters in Europe, presented its Westminster, which employs two Napier Eland N.El.229 rear-drive shaft turbines coupled to the five-blade rotor through a common gearbox via individual hydraulic clutches, reduction boxes and override clutch. It was exhibited in the "utility" form, with a skeletal tubular frame, intended as a transporter for heavy equipment, or as an aerial crane, having a lift greater than six tons.

On view in the static display but not flown was the Short SC.1 vtol research aircraft of delta-wing configuration. Power is provided by five Rolls-Royce RB.108 turbojets, four of these being mounted vertically in a central engine bay to provide lift, while the fifth exhausts horizontally at the tail for forward propulsion. Lifting engines are carried in pairs, each pair swinging on an axis so that thrust can be shifted during the transition from vertical to horizontal flight. All five engines have a compressor bleed supplying high-pressure air to a common duct, which feeds air nozzles in the wing tips, nose and tail that act as stabilizers during hovering.

Among the fixed-wing aircraft, the Blackburn NA.39 naval strike plane was on public view for the first time, although security considerations permitted only a flypast. It is intended for low-level subsonic operations; and is of integral construction, being largely machined from the solid. Design features include a stubby two-seat fuselage, broad-chord wing with movable leading edges and blown flaps, high-mounted tailplane, and split-tail air brakes. Powerplant

(*Turn to page* 79, *please*)

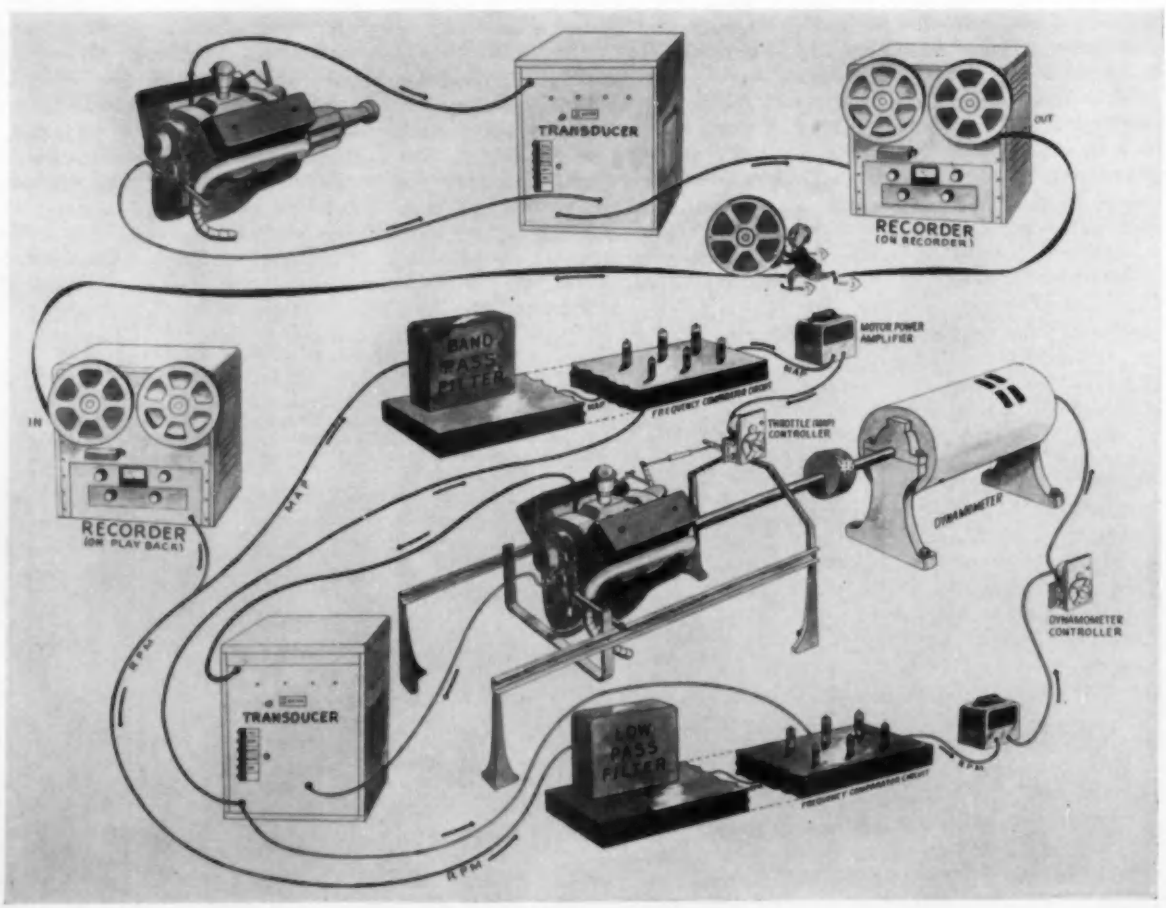
Artist's conception of the Handley Page "Treble One" transport derived from the Victor crescent-wing four-jet bomber. As an airliner it is expected to carry up to 168 passengers at a cruising speed of 544 mph.

Road Test Simulator System

Perfect Circle Corp. Records Engine Variables While Vehicle Undergoes Road Test and Uses the Recorded Information to Program Tests in the Laboratory

By Dr. Vern Vanderbilt
CHIEF RESEARCH ENGINEER
Perfect Circle Corp.

OVER the years, steady-state dynamometer tests have not revealed data comparable to that obtained under actual road testing conditions. Cycle testing on the dynamometer was and is currently used as a method of obtaining data which attempts to match road test data. However, still the results of such testing do not compare to road data. Many variables are encountered during actual road testing where the engine environment can not be controlled and repeatable tests made. This is caused by the great variance of road conditions encountered. Rain, dust, and other normal road conditions make these tests difficult to repeat. The idea of the road test recorder and simulator was then born on the premise that a more repeatable test of a road-type was necessary which actually repeated certain of the road conditions on the dynamometer stand and allowed other



Road test recorder simulator system

more erratic conditions to be eliminated.

The thought was to record certain engine variables while the vehicle was actually undergoing a road test; and later, to use the recorded information to program a test in the laboratory on the dynamometer to simulate road test conditions.

The system chosen by Perfect Circle is one which utilizes four engine conditions. These are rpm, manifold air pressure, coolant or water temperature, and oil temperature. The four variables are recorded on a single track of magnetic tape utilizing four frequency modulated carrier waves. The four waves cover a frequency range from 200 to 8000 cycles per second and thus can be easily recorded at 3⅞ in. per second tape speed.

Three of the engine conditions utilize standard telemetering channels since equipment was already available for separating these frequencies when the tape was played back. The range of 200 to 2000 cps was selected for rpm. The other three standard channels are 3000 cycles per second plus or minus 7½ per cent for coolant temperature, 5400 cycles per second plus or minus 15 per cent for manifold air pressure, and 7350 plus or minus 7½ per cent for oil temperature. Thus the recorded wave is a complex one made up of these four sinusoidal waves. When the tape is played back and the signal passed thru low pass and band pass filters, the four individual signals may then be obtained to compare to a feedback signal for each channel from the engine.

Shown here is a schematic drawing of the present system. Only two channels of control are shown in this drawing for the sake of clarity. The coolant temperature and oil temperature channels are somewhat the same as the manifold air pressure channel. The upper section of the drawing represents the recording operation and the lower section the playback on the dynamometer.

A serious problem is present in the recording of frequency modulated signals. This is due to the variation in the speed of the magnetic tape as it passes the head during recording. The magnetic tape recorders used maintain constant tape velocity by the use of synchronous capstan motors. However, in the vehicle a portable 60 cycle source must be used to furnish power to run the recorder. If this frequency deviates from the standard line frequency, a fixed deviation will occur in the frequency modulated signals; and on playback, one will not obtain the desired signal which represents a given parameter. Thus, some means of compensating for this possible line frequency variation must be utilized in this type of recording if one wants to be accurate in the playback.

This is accomplished in the Perfect Circle system by a unique electro-mechanical transducer. Overall system accuracies of less than 0.5 per cent error between record and playback operations have been attained for steady-state conditions. Oil economy data of the actual road tests and the laboratory simulated tests were considered identical.

The oil economy was determined by the use of the Perfect Circle automatic oil weight system described in a paper by the late Karl Effman of Perfect Circle, entitled "Engine Oil Consumption Determination" presented before the Indiana Section of the Society of Automotive Engineers, March 8, 1945. A copy of this paper will be forwarded upon request to the Engineering Division of Perfect Circle. ■

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BRAZING FILLER METALS FOR HIGH-TEMPERATURE SERVICE

From a talk given by A. M. Setapen, Manager of Engineering, Handy & Harman, at the Midwest Welding Conference, Chicago, sponsored by Armour Research Foundation

Brazing Alloy Type	Composition	Melts at (F)	Flows at (F)	Service
Silver-Copper-Lithium	92.3 Ag 7.5 Cu 0.2 Li	1435	1635	For brazing stainless steel at temperatures as low as 1600 F. Favored for 17-7 stainless honeycomb especially. Wets base metal in vacuum, dry hydrogen, or inert gas without flux.
Silver-Palladium	90.0 Ag 10.0 Pd	1835	1950	Some use in England; experimental in U. S. Do not penetrate or dissolve base metal to any extent.
Manganese-Nickel	70.0 Mn 30.0 Ni	1840	1875	Much used for joining stainless steels, Inconel, other heat-resistant alloys. Good strength, good oxidation resistance.
Nickel-Chromium-Silicon-Boron	72.5 Ni 16.0 Cr 5.0 Si 3.5 B (balance Fe)	1825	1840	Highest strength; highest hardness of the brazing alloys. Attacks many base metals (undesirable in thin sections).
Gold-Chromium-Nickel	72.0 Au 22.0 Ni 6.0 Cr	1785	1835	High cost, but of value where penetration of base metal cannot be tolerated. Lower hardness, better ductility than high-nickel brazing alloys.

Chevrolet Apache 36 Stepside Pickup

Chevrolet Expands Truck Line

THE number of models offered in the 1959 Chevrolet truck line has been expanded to 139, three more than last year, on 22 different wheelbases. Gross vehicle weight ratings range from 4000 to 36,000 lb. Included are 96 conventional, 22 low-cab-forward, 8-forward-control, 6 tandem-axle, and 5 school bus chassis models, in addition to a sedan delivery and a new luxury pickup to be announced later.

In the light-duty series, major emphasis is on fuel economy, with an improved six cylinder engine. The improvement derives from camshaft redesign which reduces the period valves are open during the combustion cycle and cuts the loss of fresh fuel mixture through open intake and exhaust ports. There is an increase in torque at low and medium speeds.

On the half-ton series, an optional carburetor-rear axle combination for the economy six engine is available. For use in light or bulky load operations, it consists of a special low-capacity carburetor which provides leaner mixtures and a rear axle with low numerical gear ratio of 3.38 to 1.

Principal advancements in the medium-duty line center on engine improvements. Refinements in the 261 cu in. six include heavier-duty thick-dome pistons and a cast-in steel insert in the upper compression ring groove.

Valve spring loads are reduced by 10 lb, resulting in about five per cent lower valve train stresses and an increase in spring life. Intake valve faces are now aluminized. A full-flow oil filter replaces the former partial flow unit, and features a safety by-pass valve.

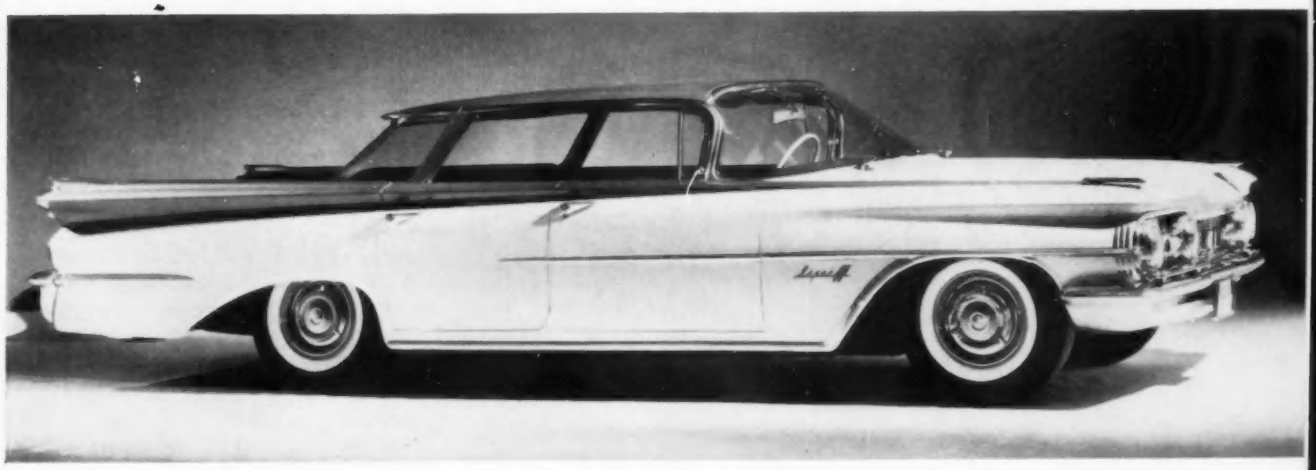
Another improvement in the 261 cu in. six, as well as in all Chevrolet-V8 truck engines, is a new thermostatically-controlled by-pass cooling system, replacing the permanent type formerly used. It involves a 160-deg thermostat incorporating a primary and secondary valve. During warmup, the primary valve remains closed, so that all coolant by-passes the radiator and is diverted through the secondary valve to the water pump for recirculation through the engine. As the engine reaches normal operating temperature the primary valve opens, closing the secondary port and directing all coolant through the entire cooling system.

Heavy-duty 283 cu in. V8's are improved through heavier, solid-slipper skirt pistons. Dome thickness is increased to 0.480 in. from 0.380 in. and top, second, and bottom lands are heavier. A cast-in steel belt controls thermal expansion, and there is a steel insert on the topside of the upper compression ring.

The heavy-duty line features a new optional power train for 70 and 80 Series trucks. It consists of a 185 hp, 348 cu in. engine, heavier clutch, close ratio five-speed or Powermatic transmission, and a 16,000 lb single rear axle or 30,000 lb tandem. This combination results in a 12 per cent increase in pulling power. As a result the GCW rating has been increased to 38,000 lb.

Another addition to optional equipment offered for 1959 is a close-ratio five-speed transmission on heavy-duty models. Five-speed conventional ratio transmissions are optional on 50 through 80 Series and standard on 90 and 100. Powermatic is offered as an option on all truck series from 50 up, except forward-control models.

Valves in the 348 cu in. V8 heavy-duty truck engine have 0.125 in. smaller, fully-aluminized heads.



Super 88 Sport Sedan

Oldsmobile for '59

A LINE of completely redesigned cars has been launched by Oldsmobile for the 1959 model year. They are as low as ground clearance and head clearance permit and have a wider base on the ground due to an increase in tread to 61-in. front and rear. Four-door sedans are all of six-window type, all models having windshields with 46 per cent more glass area. Holiday Hardtop Sport Sedans are of four-window type with a flat, slim roof and a wrap-around rear window. Holiday SceniCoupe models (hardtop coupe) have a large, dome-like rear window fitted with a special heat-reflective glass which is standard on all models.

The engine setup is of major interest. There are two engines this year, the 371-cu in. economy engine further improved for the Dynamic 88; and a 394-cu in. engine for the Super 88 and the 98. The cylinder block for both engines is new to provide for greater rigidity and larger main bearings.

Both engines are quieter running and much smoother in operation. Some of this improvement is credited to the introduction of a longer, more rigid crankshaft; larger main bearings, increased by ¼-in. in diameter; larger connecting rod bearings with a corresponding increase in rigidity. Improved carburetors are found on both engines, one of the distinctive features being the adoption of a new type of choke mechanism. Termed a split-choke, it is so designed that the choke element releases quickly after starting so as to yield greater fuel economy, particularly on short runs and in cold weather operation. The fast-idle, however, is permitted to remain in action until the engine warms up properly.

Cylinder heads, common to both engines, have a thicker deck and better cooling. The intake manifolds have been redesigned for better breathing, while exhaust manifolds have been provided with larger, free-flowing ports. Another feature contributing to better breathing is an increase in intake valve diameter to 1⅞ in.

Air cleaners are new—with a replaceable filter element on the four-barrel carburetor; and an oil-wetted aluminum foil on the two-barrel carburetor.

Wheelbase on the Dynamic 88 and Super 88 has been upped to 123-in., the 98 remaining substantially the same as before. Super 88 and 98 models have larger—9.00 x 14 tires, while the Dynamic 88 has 8.50 x 14 tires.

Brakes have provisions for improved air cooling. This is accomplished by the introduction of an extended flange on the brake drums, increasing metal area some 200 per cent. Wheel cylinder size has been increased slightly; front cylinders are 1⅛ in. diameter, while rear cylinders now are a full one-inch diameter.

The standard suspension system has been improved materially through the use of softer action

(*Turn to page 80, please*)

1959 OLDSMOBILE ENGINES

(Both OHV-V8)

Model	Dynamic 88	Super 88 and 98
Bore (in.)	4	4⅛
Stroke (in.)	3 11/16	3 11/16
Displacement (cu in.)	371	394
Compression ratio	9.75:1	9.75:1
Bhp (max.)	270	315
Torque (lb ft) max.	390	435
Carburetor	2-bbl	4-bbl

Polish Truck Factory

Makes Everything from Pig Iron to Bricks

By David Scott
Special European Correspondent
for AUTOMOTIVE INDUSTRIES

Fifty forward-control Star trucks come off the final assembly line daily. Most are absorbed by the home market, but some are exported to China and Bulgaria.

THE Starachowice truck factory is perhaps unique among automobile plants in Poland in that it is operating at close to full capacity and is producing a vehicle of all-Polish design. In addition, it is the most highly integrated, meeting some of its own requirements even in pig iron, and making bricks for new buildings from the slag and limestone.

Located some 80 miles south of Warsaw, the plant dates back to the 18th century, when it was devoted to smelting iron from local ore and wood. The first engineering shops were built in 1925 with production concentrated on Bofors anti-aircraft guns. Expansion was rapid, and the poor soil of the region provided an abundance of cheap labor ready to leave the surrounding farms.

During the war the Germans continued making arms there, and on their retreat they took all the machines with them and even dismantled and removed some of the steel buildings. This equipment was later recovered by the Poles, including some buildings which were re-erected on the original site. Truck manufacture started in 1948 when 20 vehicles were turned out.

Since then 50,000 units have been produced, aside from bus chassis. The basic Star truck is a forward-control four-tonner with a 255-cu in. six-cylinder gasoline engine rated at 85 hp. It was designed by two professors from the Lodz Technical College.

Current output is 10,000 trucks annually, or 40 a day, with a total

Connecting rods are forged in opposed pairs to give symmetrical die loading, then separated on the Polish universal miller with four-sided fixture. Bearing caps in a circular pair are split in the same way.

of 8000 employes on two shifts. This work force is spread over a wide range of operations, covering production not only of parts that most automobile plants would get from outside suppliers, but also of many of the tools. The extensive tool rooms now in use were originally intended to supply other factories in Poland, but it was found that they were occupied full time just with the needs at Starachowice. In addition to the usual special tools they make standard items like milling cutters, broaches, reamers, gear hobs and shavers, thread-rolling dies, gages and taps.

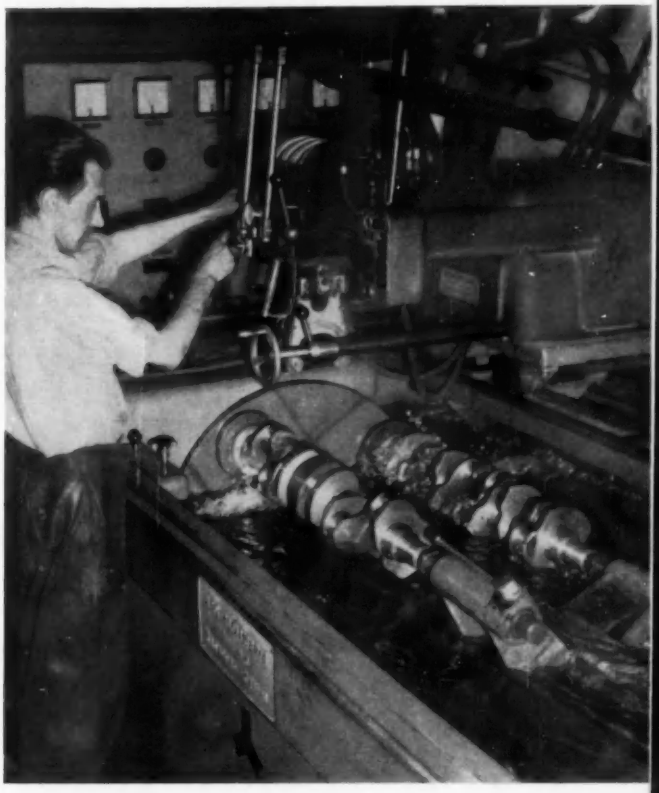
Equipment in these large shops is typical of the entire factory. All of the universal machines are Polish, most of the special-purpose ones are Russian, Czechoslovak or East German, while there is a sizeable number of modern western units. For example, alongside an East German coordinate borer is a Hydroptic jib borer bought from Societe Genevoise in 1956, together with two older machines from the same Swiss firm.

Two new machine shops, completed four months ago, give the same picture. Here the plant's unusual degree of self-sufficiency is reflected in the white, home-made bricks seen everywhere, and in a production program that includes oil filters, fuel pumps, hydraulic brake cylinders and vacuum servo units. The simple explanation is: "we can't order these, so must make them ourselves."

Machine tools are again mainly Polish, but among imported ones are several of the latest Maag gear shapers in the bay devoted to transmissions. These shops are probably the most modern in the country, being light and airy, with travelling cranes and a considerable number of conveyors and other handling equipment. Power lines for the machines are carried on overhead busbars to permit the flexible floor layout desirable for limited output with occasional design changes.

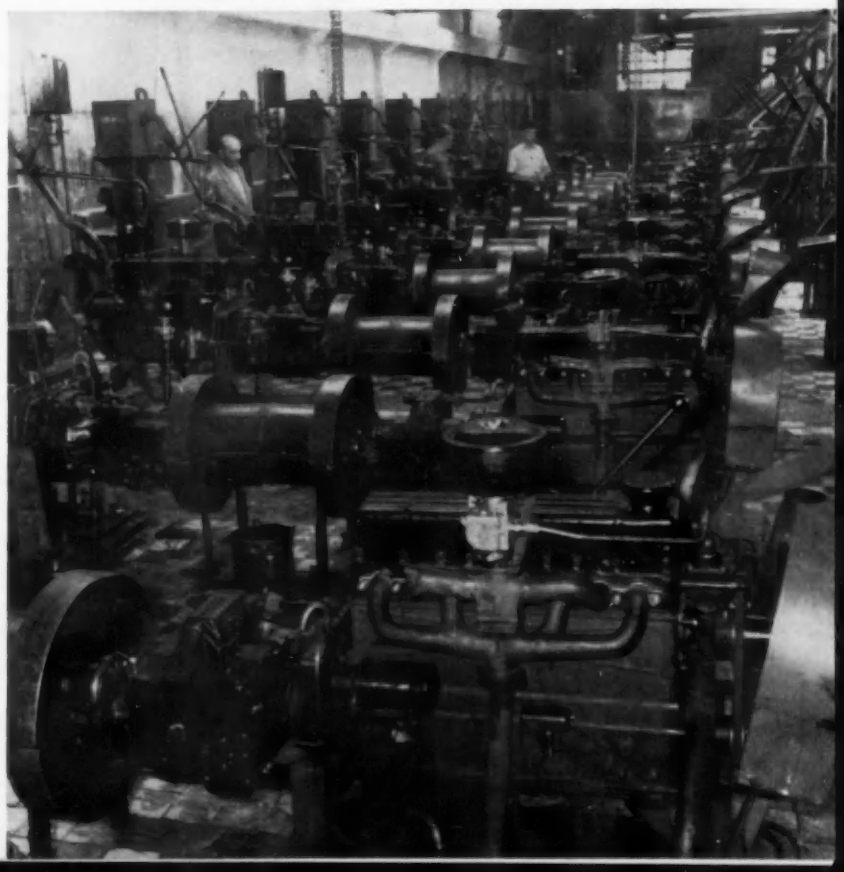
Flexibility is the keynote of most of the tooling, although there is one three-station automatic trans-

(*Turn to page 92, please*)



Alfing machine with AEG - Elotherm induction heating equipment is used to harden crankshaft bearings. Four shafts are carried in the rotating fixture which indexes automatically at preset intervals. The C-shaped coil is manually positioned to heat one bearing at a time, after which the revolving shaft is quenched in the tank and the corresponding bearing on the next shaft treated. Then the rail-mounted high-frequency unit is moved along for the next sequence of four bearings.

Engines paired back-to-back in the test bay are first motored for 1½ hours, then run under their own power for the same period to drive new ones while they are flushed, checked and adjusted.



AUTOMATION NEWS REPORT

AUTOMATIC CONTROLS

PRODUCTION—VEHICLES—AIRCRAFT

By Samuel Cummings

AUTOMATED ROTARY SURFACE GRINDER

Heald Machine Co. has developed an automated system for a rotary surface grinder that has increased the machine's production and reduced the cost per part, according to Clifford G. Menard, chief grinding engineer.

Automation of the rotary surface grinder — not ordinarily a high-production machine — is accomplished by a hydraulically operated mechanism that loads and unloads the grinder simultaneously. One arm picks up the workpiece from the loading chute, positions it over the rotating table and places it in the air-operated chuck. At the same time, a second arm removes finished work and deposits it in the unloading chute.

An after-gaging station on each unloading chute checks finish size automatically and feeds a signal back to the diamond unit when it detects over or undersize parts. The signal automatically corrects any tendency of the unit to drift out of size.

The company said the automation system can be applied to all models of standard Heald rotary surface grinders. (*See top photo*)

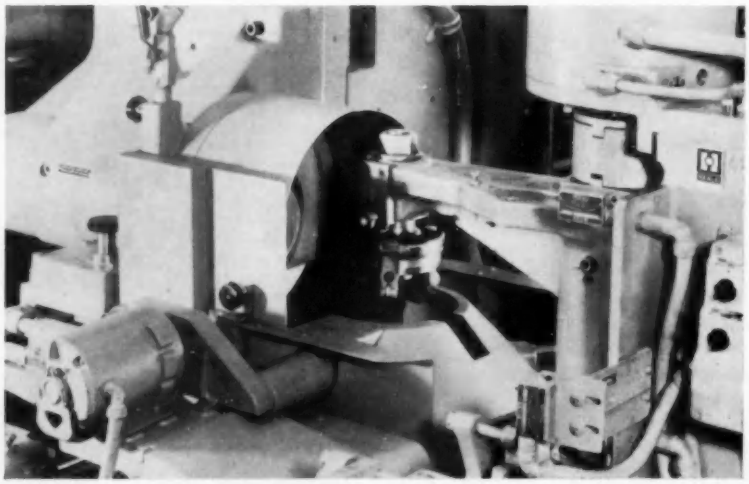
CENTRALIZED PARTS DEPOT

Clark Equipment Co. has set up a centralized system of distribution of replacement parts at its new Chicago warehouse, replacing the company's four regional depots. All replacement parts from the automotive, industrial truck, and construction equipment divisions are now warehoused and shipped from the new $3.5 million facility, known as the Central Parts Div. (*See diagram below*)

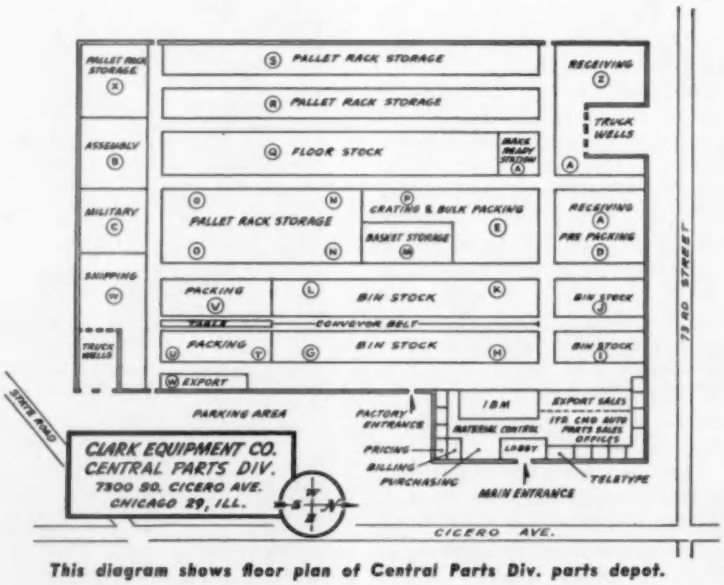
Heart of the new distribution system is a highly automated IBM data processing system and a teletype arrangement connecting about 120 dealers in all parts of the U. S. and Canada with the Chicago depot.

The IBM system receives and records orders, keeps the inventory of about 4.5 million parts balanced daily, makes up shipping papers, "pick tickets" invoices,

(*Turn to page* 88, *please*)



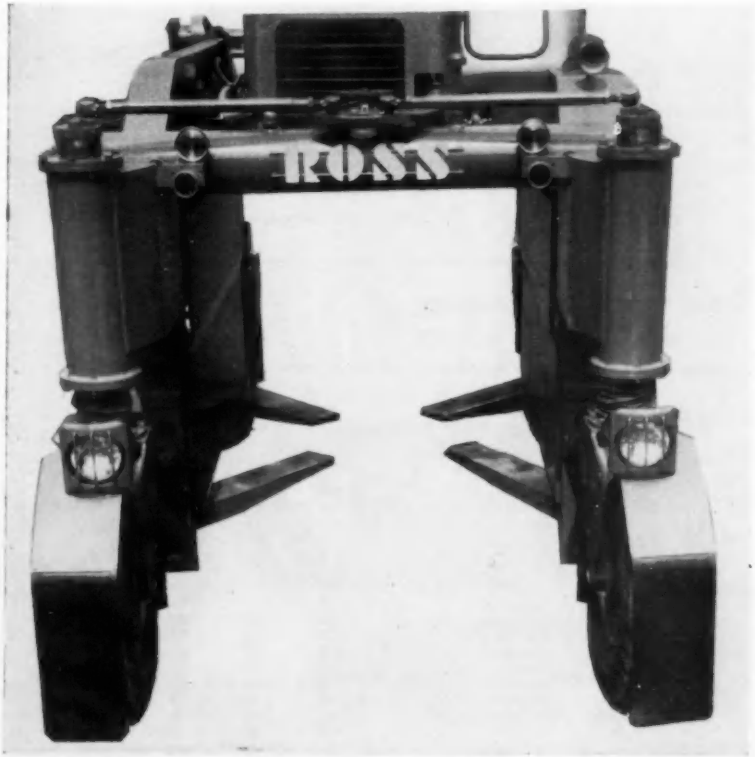
Close-up of Heald Model 261 rotary surface grinder with automatic loading mechanism, center. At left is special slide-bar radius blending attachment.



This diagram shows floor plan of Central Parts Div. parts depot.

At end of chassis crating line, end of crate is raised by platform lift to provide clearance for carrier hooks. Length of crate varies from 16 to 36 ft. Carrier backs over crate and operator actuates pivot hooks. Clark Equipment Co. photo.

Special Handling Equipment for Crated Motor Vehicles



View of forks on Clark-Ross pivot hook straddle carrier, showing how forks swing in to form two arms under load. Clark Equipment Co. photo.

THE Aacon Contracting Co. is an export packing firm whose function is to disassemble and crate products being shipped overseas. About 50 per cent of its business is in crating trucks while the other 50 per cent includes a number of automobiles and a variety of goods from construction machinery to electronics equipment.

To accomplish this Aacon relies on two basic tools: 1) equipment designed particularly for the job (very often designed by Aacon engineers), and 2) fast and sure materials handling techniques.

Aacon has three plants about a block apart in the Atlantic Basin section of Brooklyn, N. Y. Two of the plants are similar in layout and equipment—the largest plant used almost solely for the crating of trucks, and a plant which handles some trucks and most of the other products which require special packing. The third plant is used for boxing small articles.

The truck disassembly procedure is, in effect, the opposite of assembly-line techniques. A truck is driven into one end of the plant, at the beginning of a 300 ft drag conveyor running the length of the building. At this point the cab is removed. The truck is then hitched to the drag line and proceeds through several stations where the tires, axles, springs, fenders, hood,

(*Turn to page* 89, *please*)

• • INDUSTRY STATISTICS • •

WEEKLY U. S. MOTOR VEHICLE PRODUCTION

As reported by the Automobile Manufacturers Association

Make	Weeks Ending Sept. 13	Weeks Ending Sept. 6	Year to Date 1958	Year to Date 1957
PASSENGER CAR PRODUCTION				
Rambler	4,300	4,083	122,268	66,817
Total—American Motors	4,300	4,083	122,268	66,817
Chrysler	273	5	35,870	93,379
De Soto	590	64	23,840	69,185
Dodge	2,464	990	72,021	220,554
Imperial	3	.....	8,450	30,175
Plymouth	3,814	666	260,306	512,037
Total—Chrysler Corp.	7,144	1,725	400,487	945,330
Edsel	.....	.....	8,503	32,712
Ford	1,742	1,343	651,960	1,125,714
Lincoln	210	312	17,714	27,988
Mercury	.....	.....	84,949	221,565
Total—Ford Motor Company	1,952	1,655	763,126	1,407,979
Buick	5,515	4,122	150,005	298,474
Cadillac	432	.....	89,942	117,991
Chevrolet	.....	.....	885,547	1,123,685
Oldsmobile	2,779	510	206,465	296,862
Pontiac	1,902	242	138,854	262,692
Total—General Motors Corp.	10,628	4,874	1,470,813	2,099,704
Packard	.....	.....	1,723	4,618
Studebaker	.....	.....	21,601	43,010
Total—Studebaker-Packard Corp.	.....	.....	23,324	47,628
Checker Cab	.....	.....	2,120	2,891
Total—Passenger Cars	24,024	12,337	2,782,138	4,570,349
TRUCK AND BUS PRODUCTION				
Chevrolet	29	.....	183,490	256,232
G. M. C.	969	.....	41,655	48,515
Diamond T	122	113	3,751	3,895
Divco	70	52	1,946	2,211
Dodge and Fargo	869	.....	39,296	57,489
Ford	.....	669	149,154	252,953
F. W. D.	29	18	873	815
International	1,768	1,486	64,373	87,053
Mack	265	223	10,412	12,454
Studebaker	100	80	6,917	9,632
White	357	80	11,425	13,957
Willys	2,324	1,811	58,783	92,709
Other Trucks	40	40	2,055	3,078
Total—Trucks	6,642	4,572	574,130	800,993
Buses	54	17	2,367	3,046
Total—Motor Vehicles	30,720	16,926	3,358,625	5,374,388

TRUCK FACTORY SALES BY G.V.W.

Automobile Manufacturers Association

G. V. W.	July 1958	July 1957	Seven Months 1958	Seven Months 1957
6,000 lb and less	32,958	47,150	248,493	327,611
6,001-10,000 lb	9,271	13,099	75,057	99,892
10,001-14,000 lb	1,005	3,061	8,316	24,179
14,001-16,000 lb	7,223	15,074	53,248	105,568
16,001-19,500 lb	6,502	6,897	56,214	45,238
19,501-26,000 lb	3,619	5,888	31,218	31,110
26,001-33,000 lb	2,083	3,275	17,741	23,526
Over 33,000 lb	2,387	2,541	17,108	22,156
Total	65,048	96,985	509,395	679,280

U. S. PASSENGER CAR FACTORY SALES

DOMESTIC AND FOREIGN MARKETS

Month	Total	Domestic Market	Foreign Market	% Foreign
January	478,416	462,674	15,742	3.29
February	396,221	383,516	12,705	3.21
March	359,464	346,297	13,167	3.66
April	322,482	309,904	13,578	4.21
May	352,076	340,599	11,477	3.26
June	342,228	334,311	7,917	4.32
July	316,408	310,001	6,407	2.02
Total—Seven Months	2,567,295	2,486,302	80,993	3.15

REGISTRATIONS OF FOREIGN CARS

*First Seven Months**

1958		1957	
Volkswagen	46,848	Volkswagen	36,331
Renault	21,588	Renault	10,309
English Ford	16,364	M. G.	7,959
Fiat	9,816	English Ford	7,449
M. G.	9,342	Metropolitan	6,473
All Others	88,080	All Others	35,138
Total	192,038	Total	103,659

*—Does not include returns from Oregon for July 1958 and 1957.

1958 NEW REGISTRATIONS

Based on Data from R. L. Polk & Co.

Arranged in Descending Order According to the Seven Month 1958 Totals

NEW PASSENGER CARS

Make	July 1958*	June 1958	July 1957*	Seven Months 1958*	Seven Months 1957*
Chevrolet	115,781	121,000	133,784	775,258	856,190
Ford	85,104	87,177	135,934	585,656	899,604
Plymouth	38,579	34,255	58,971	237,382	374,741
Oldsmobile	25,147	26,678	28,665	193,230	227,960
Buick	17,935	20,662	31,284	159,469	249,296
Pontiac	17,615	19,361	27,066	139,973	196,647
Rambler	17,587	17,256	9,639	96,107	53,579
Mercury	12,603	12,100	24,186	83,474	168,456
Dodge	11,450	10,926	24,707	80,175	160,840
Cadillac	10,303	10,753	11,338	78,348	85,072
Chrysler	5,235	4,888	8,815	37,672	66,078
De Soto	3,805	3,886	8,347	30,316	65,796
Edsel	2,629	3,254	.....	24,632	.....
Studebaker	3,399	3,656	6,630	24,341	37,807
Lincoln	1,770	1,938	2,589	17,238	22,394
Imperial	1,121	1,125	2,795	9,562	21,084
Metropolitan	1,169	1,149	1,306	6,892	6,446
Packard	228	235	463	1,900	3,781
Misc. Domestic	324	181	1,534	1,874	13,042
Foreign	31,502	30,129	18,539	185,146	96,843
Total—All Makes	400,286	410,807	536,582	2,788,645	3,607,457

*—Does not include returns for Oregon for July of each year.

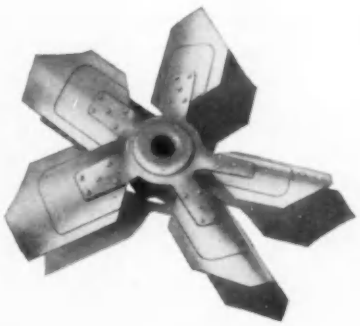
NEW TRUCKS

Make	July 1958*	June 1958	July 1957*	Seven Months 1958*	Seven Months 1957*
Chevrolet	23,044	23,646	27,265	145,586	173,105
Ford	17,046	19,327	25,186	116,406	160,737
International	7,325	6,753	9,099	50,464	54,154
G. M. C.	4,773	4,392	5,195	30,327	37,242
Dodge	3,263	3,123	3,942	22,159	28,173
Willys Truck	937	962	1,217	7,157	8,836
White	978	873	1,333	6,923	9,304
Mack	1,209	970	1,231	6,902	7,798
Willys Jeep	586	497	837	3,386	3,625
Studebaker	383	353	516	2,645	4,305
Diamond T	275	225	306	1,675	2,025
Divco	175	208	197	1,308	1,680
Brockway	74	69	57	470	406
Kenworth	49	62	116	413	629
Peterbilt	47	46	60	243	318
F. W. D.	31	30	38	238	292
Misc. Domestic	81	62	65	483	503
Foreign	2,297	2,377	1,326	14,286	7,363
Total—All Makes	63,383	63,995	77,684	410,972	500,496

See SCHWITZER

FOR A New Approach

in Cooling Fans



Creative Engineering and a New Approach have been promoted by Mr. Louis Schwitzer, Sr. for forty years, from his first product, the Cooling Fan, to the present day solutions of complex cooling problems.

Schwitzer has the experience and facilities to design and to apply the right fan for your application.

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OIL PUMPS
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SUPERCHARGERS

Versatile Advanced Designs for an Economical Solution to Your Cooling Problems

Circle 139 on Inquiry Card for more data

News of the MACHINERY INDUSTRIES

By Charles A. Weinert

E. W. Bliss Co. Announces Readiness of Equipment for Commercially Producing High Quality Copper Strip from Metal Powder Using the Chemetals Process

Strip from Metal Powder Developed by E. W. Bliss

High quality copper strip from powder metal is now ready for commercial production, according to E. W. Bliss Co.

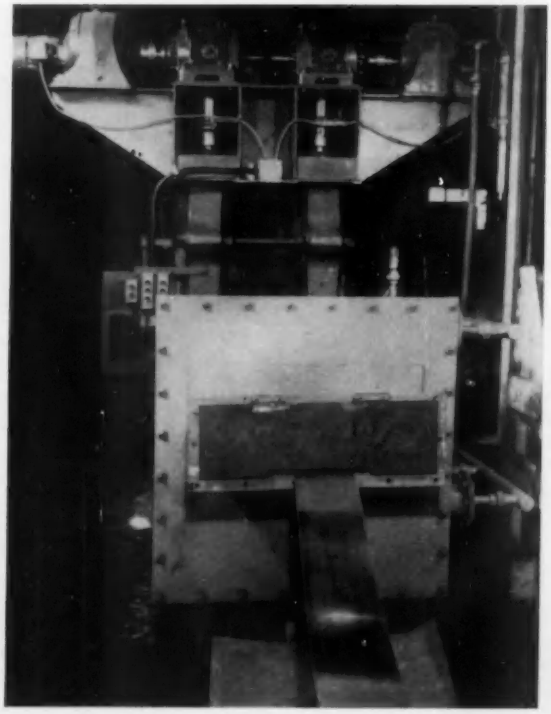
This announcement follows more than six years of research at the company's pilot sintering line in Salem, Ohio, where equipment to make commercial production feasible has been under development. A preview of the pilot line was contained in AUTOMOTIVE INDUSTRIES for July 15, 1957, page 92.

Savings of about 80 per cent of conventional equipment and rolling costs are claimed to be possible. Tests of the material's physical properties have indicated tensile strengths better than those of electrolytic grade copper strip produced by conventional methods. These tests, conducted by Bliss, a major producer of copper products, and independent testing laboratories, also showed the material to have a lower oxygen content.

While most of the experimental work has been with copper, the process has application to other metals, nickel showing much promise.

The process begins with chemical production of metal powder from various sources — cements from mining pits, scrap, ores and concentrates, and others. The powder is fed via hopper and guide arrangement through a mill for green compacting; and is subsequently passed continuously into a protective-atmosphere heating furnace for sintering. On delivery from the surface it is immediately hot-rolled. Then, depending upon the material, it may be sintered and hot-rolled again to produce metal compressed to full density.

George Perrault, Jr., Bliss vice-president in charge of the Rolling Mill Div., said his company is now in a position to make complete "turn key" installations of equipment to produce strip from powder metal, and is already working closely with several potential producers from among established names in the non-ferrous industry.



Hot-Rolled Copper Strip from Metal Powder — Here is the final product as it comes out of the furnace, where it has been sintered in a protective atmosphere. E. W. Bliss Co. developed equipment for commercial production in cooperation with Chemetals Corp. of New York City, patent holder and licensor of the new process.

Cutting Oils Taxed

Oils used in a number of machine tool operations are to be Federally taxed at the oil producers' level.

The Internal Revenue Service has decided the Federal excise tax on cutting oils applies to oil used on metals in broaching, blanking, drilling, milling, turning, and die cutting of threads.

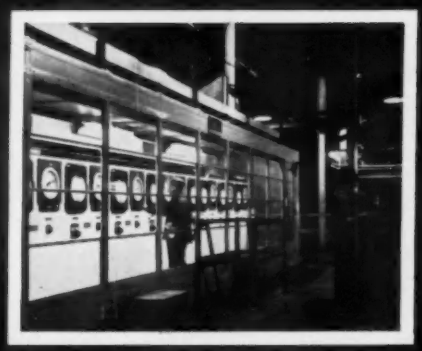
Application of the tax is outlined by the IRS in its new Revenue Ruling 58-440.

Around the Industry

Ex-Cell-O Corp. has puchased a German company, located at Geoppingen, Wurttemberg, which will operate as an independent subsidiary. The overseas company has been producing lathes and medium-size planers, as well as textile looms. An 11-acre site in nearby Eislingen has also been bought for a new plant, which will enable the German subsidiary to manufacture Ex-Cell-O products for the European market.

(*Turn to page* 90, *please*)

ARISTOLOY



No guesswork here. Soaking cycles and temperatures are accurately recorded from this room. Each pit is individually controlled, and soaking of different steels can be varied to meet your requirements.

CONTROLLED SOAKING Produces Controlled Quality Steels

Controlled heating before rolling aids in producing controlled quality steels. Copperweld's new battery of soaking pits provides precise regulation of temperature and time during this important operation. The benefit to customers — controlled quality and improved Aristoloy products.

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Circle 140 on Inquiry Card for more data

Observations

By Joseph Geschelin

New Cars

The 1959 cars are not simply face-lifted as some people have said recently. GM divisions have all new cars and several other makes have new body shells and sheet metal. Even those that have the same body shells have expended considerable effort and a great deal of money in freshening outward and interior appearance. The day of the so-called face-lift is gone. Sheet metal changes as well as the other changes at the front and rear cost too much today to be dismissed as face-lifts.

New Engines

Engines will have increased displacement in a fair number of cars; and increased horsepower on most. Significantly, compression ratio has been decreased in a large number of cases to compensate for variations in fuel octane ratings over the country. Fuel injection is practically out of the picture insofar as the majority of models are concerned. Economy is being stressed to a greater degree than any time in the past 10 years. Six-cylinder engines are being offered on two major makes that have employed V-8's exclusively, while others are stressing two-barrel carburetor options with special calibration leading to improved economy.

Air Ride

This feature suffered from the recession. People bought fewer cars and were fussy about costs on what they did buy. As a result only a few makes continue the complete system released for 1958. One entire family of five makes does not offer air ride at all, while Chrysler is making available air springs at the rear, only for leveling. Judging by the reaction this season, it would appear that a simplified air ride system, designed exclusively for leveling has the best chance for survival.

Exhaust Systems

New systems are being simplified, the tendency being to single exhaust in many instances. Several years ago when dual exhaust was the big thing, it was justified by an important gain in engine output. Now the engineers say they have succeeded in improving engine performance to such an extent that a single exhaust is good enough.

Heavy Mufflers

Mufflers are getting extended life through the use of heavier material as well as galvanized and aluminized stock. The high cost of replacement is beginning to catch up and something is being done about it. Incidentally, one expert observed that present dual exhaust systems in addition to being more costly also need replacement sooner. The reason for this is that dual exhaust systems run cooler, hence corrode more readily.

Luster Paints

Paint has been given special attention. Fisher Body now employs a new material that does not require waxing or polishing, will retain luster for a long time, possibly until the car gets in the hands of the second owner. Chrysler too has a new finish, requiring polishing only at long intervals. This will represent a big saving to car buyers. Even though it will reduce the market for polishes, it still leaves plenty of business for service stations and suppliers in taking care of the 60-million or more cars now on the road.

Large Glass

Glass goes up materially in area and weight, due to larger windshields, reaching farther into the roof panel; and much larger rear windows. This, in turn, demands larger windshield wipers with more driving power. Some makes have introduced electric windshield wipers, others have larger vacuum boosters.

Low Roofs

Roof lines are getting lower and passengers are housed closer to the ground. Underbodies are dished to give more passenger head room, making it more difficult to get in and out. Too the tunnels loom larger, except in cases where special effort has been made to relieve the situation. One make has increased wheelbase materially to move the engine forward and decrease driveshaft angularity. In this case, the tunnels are smaller than before. On Chrysler cars, of course, the buyer can specify swivel seats at the front to make entry and exit more of a pleasure.

Hercules Will Handle German Ilo Engines in This Country

Hercules Motors Corp. will handle the German-made Ilo engine line in this country on an exclusive basis. Hercules president William L. Pringle says the air-cooled diesel and gasoline industrial engines will be sold and serviced by the 76 Hercules distributors in the U. S. The Ilo gasoline engines range from 1 to 33 hp.

STUDEBAKER—PACKARD—Outstanding cars using Perfect Circle piston rings for both original equipment and replacement service.

"How can we make them better?" This question has long dominated the thinking of Perfect Circle's research, engineering and manufacturing people. Finding answers is a constant challenge ...and one which has resulted in many important contributions to the performance of the modern motor car. Like Perfect Circle 2-in-1 Chrome piston rings, for example!

PC 2-in-1 Chrome sets are specifically engineered to meet the exacting demands of today's engines. That's why Perfect Circles are preferred by more engine manufacturers for original equipment and for replacement service than any other brand of piston rings.

Whenever you have a problem concerning piston rings or related engine components, you are invited to call upon our engineering and research facilities. Perfect Circle Corporation, Hagerstown, Indiana; The Perfect Circle Co., Ltd., Don Mills, Ontario, Canada.

PERFECT CIRCLE PISTON RINGS

Circle 141 on Inquiry Card for more data

METALS

Fall Pickup in Orders for Steel are Sharper than Expected. Upturn in Aluminum Output. Improved Demand for Copper

By William F. Boericke

By mid-September steel production was up to 1.7 million tons weekly or 65 per cent capacity compared with 1.5 million tons in July. The fall pickup was sharper than expected. Orders were running definitely ahead of production, and backlogs were increasing. The uptrend was being effected without much help from Detroit, where the unpleasant prospect of a major strike in the automobile industry was given a 50-50 chance. In consequence the automobile manufacturers were placing orders piecemeal and much below expectations. If a strike is averted and full production resumed in Detroit, it is more than likely that steel makers will receive a surge of orders, with demand for fast deliveries.

If a strike does occur, unquestionably it would temporarily affect the steel recovery but perhaps not to the extent feared in some quarters. It seems likely that automobile makers would continue to stock some of the steel they need, fearing the end of the strike would bring so large a bulge in the order books that deliveries might be seriously delayed. Yet buyers are aware there is considerable shut-in production capacity in most plants for flat rolled sheet and strip that could be called for help when needed.

Construction Strong Prop in Steel Market

Aside from the automobile industry, steel producers are generally well satisfied with the volume of orders being received. Particularly gratifying is the call from the construction industry, now the strongest prop in the market for steel. Structurals are in high demand. Other firm spots include the appliance manufacturers, makers of agricultural machinery, galvanizers, and tin plate. Although the pace for the latter has slackened slightly, consumers of tin plate now believe there will be no price increase before November, and it may be delayed until the end of the year. On the slow side are reinforcing bars, barbed wire, and nails, all subject to heavy competition from abroad. Railroad buying is quiescent. Manufacturers of stainless steel are receiving most of their orders from the aircraft, missile, and appliance fields, little from Detroit. Some pipe makers report good demand, others are still waiting.

Titanium Sales Improve

While total shipments of fabricated titanium products for the half year were scarcely one quarter of the volume in 1957, due of course to the defense cut-backs, some satisfaction is gained from gradual improvement in recent months, particularly in sheet, plate, and strip production. From a statistical standpoint the titanium industry is doing much better than in the last half of 1957. With less amounts required in the aircraft field, titanium manufacturers are giving major attention to the chemical industry where the metal's non-corrosive qualities have special importance.

Ferro-Chrome Prices Raised, Zirconium Cut

The two major domestic producers of ferrochrome raised prices on some grades of ferrochromium alloys from ¾ to 4 cents a pound of contained chromium, which reestablishes prices at the same level as the first of the year. On the other hand, a sharp reduction in the price of zirconium sponge used in nuclear reactors was announced. The new price is $6 a pound for sponge, contrasted with previous price of $7-7½. The principal customer is the Atomic Energy Commission.

Production of Aluminum Slightly Higher

The decline in the domestic production of primary aluminum appears to have ended and the latest figures show a moderate increase in monthly output. True enough, by comparison with 1957, the total tonnage is about 85,000 tons less than the comparable period last year, a decline of nine per cent. But there is tangible evidence that the upturn has come by the fact that three new potlines have been activated by Kaiser, and one by Reynolds which have raised their output from about 71 per cent to 83 per cent of capacity. In contrast, however, neither Alcoa nor Alcan has announced plans to up output and both are operating at about 70 per cent capacity.

Zinc Statistics Encouraging

Zinc producers have good reason to feel encouraged by the August statistics of the Zinc Institute. A lot of interesting comparisons are in order. Domestic deliveries were up 8600 tons in the month to total 68,700 tons, the highest for the year, and 22,100 tons more than in April, the low month of the year. Deliveries exceeded smelter production of slab zinc by 5800 tons, likewise the first time this has occurred in 1958. In consequence stocks declined to 251,500 tons, which represents the first

(*Turn to page* 86, *please*)

Continuous high production plus precision are built into this CTU cylindrical grinder.

You, too, can have the "Touch of Gold" with a Norton Grinding Machine

This is one of the most profitable machines industry knows. It is widely used for the demanding tasks of production precision cylindrical grinding. It is a product of Norton Company's ingenuity and knowledge of the great and varied science of grinding . . . one in which Norton has specialized for scores of years . . . a field in which it has become world leader.

You literally have the "Touch of Gold" when you use a Norton Grinder. Its ability to produce faster and with greater precision is added value that creates more wealth . . . helps everybody earn more.

It will pay you to inquire how Norton Grinding Machines and Lappers can give your company the "Touch of Gold." NORTON COMPANY, Worcester 6, Massachusetts.

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Making better products...to make your products better

Lowers original equipment costs!
Lowers selling price of truck!
Lowers fuel, maintenance and replacement costs per truck mile!

Lipe

DIRECT PRESSURE CLUTCH

Vital component in today's most economical system of power transmission, the Lipe DPB Heavy-Duty Clutch costs less at the start... materially reduces the competitive selling price of the vehicle . . . and affords substantial savings in over-all truck-operating costs per mile.

Other elements of the power-train contribute to these savings, but the Lipe DPB Heavy-Duty Clutch absorbs the greatest shocks and fiercest friction, dissipates the most heat, and by its simplicity, direct drive, easy adjustment and replacement-exchange, keeps the vehicle rolling with less cost for fuel, brake relining, oil replenishment and repair. Its worth in highway safety and preventative brake maintenance alone places it far in advance of costlier and more complicated drive components.

Advanced thermodynamic design and positive air circulation add up to a heavy-duty clutch of uncomplicated design with few moving parts. In short, it's a clutch with a low maintenance cost that matches both its low first cost and greatly lower truck-mile costs of operation.

● Lipe DPB clutches now available in 12", 13", 14", 15" single and two plate models. Write for engineering data sheets on the sizes which interest you.

LIPE ROLLWAY

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MANUFACTURERS OF AUTOMATIC CLUTCHES AND MACHINE TOOLS

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Memo to a Man of "Parts"

The number of different parts made from Roebling High Carbon Specialties, Flat Wire and Spring Steel are close to countless.

Some things you can count on, though, are the consistent dimensional and mechanical uniformity you get with any Roebling High Carbon Specialty. They are the qualities that contribute to speeding *your* production and cutting *your* costs.

They are high qualities that make for high values. Next time you need flat wire or spring steel, specify Roebling. Write Wire and Cold Rolled Steel Products Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

ROEBLING

Branch Offices in Principal Cities
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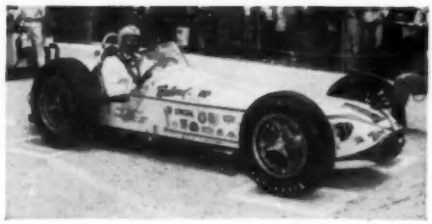
Roebling... Your Product is Better for it

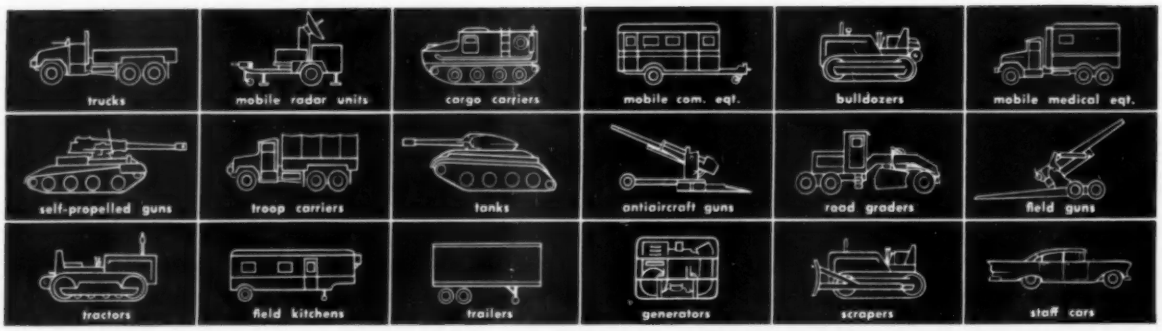
Here's proof:

Magnesium alloy wheels can "take it"



MAGNESIUM WHEELS WIN AGAIN! In 1958, and every year since 1950, the Indianapolis Motor Speedway winner has ridden to victory on magnesium wheels. So well have these wheels stood up to this rugged exhausting ordeal that every car in the '58 race was equipped with magnesium wheels.

THE MULE, M274, with its extruded magnesium platform and cast wheels is the army's first tactical vehicle to carry *more* than its own weight. Designed to operate over the toughest terrain, the M274 utilizes fully the light, strong, durable characteristics of magnesium. Because of its strength, this 900 lb. vehicle can carry 1,000 lbs. of equipment.



AIRLIFT EQUIPMENT is an excellent application for lightweight magnesium wheels. Many types of vehicles used for airlift and air-drop operations, as well as for electronic housings and other types of military equipment, are made with magnesium. Shown above is airlift equipment ideally suited for magnesium alloy wheels. For more information, contact the nearest Dow sales office or write to THE DOW CHEMICAL COMPANY, Midland, Michigan, Department MA 1412E.

YOU CAN DEPEND ON DOW

Circle 143 on Inquiry Card for more data

Farnborough Air Show

(*Continued from page* 59)

comprises two de Havilland Gyron Junior 7000-lb thrust jets.

A trend in the British industry towards large transports was indicated at Farnborough by the disclosure of models and of a few details of several projected models. One of these is the Blackburn B.107A, using the wing and tail units of the piston-engined Beverley but powered by four Rolls-Royce Tyne turboprops. Fuselage dimensions are considerably greater, with the freight compartment volume increased from 5000 to 8893 cu ft and the payload from 48,000 to 58,000 lb. Anticipated range with an all-up weight of 175,000 lb is 1500 miles.

Handley Page released further information about the HP.111 ("Treble One") combined strategic and tactical military transport derived from its Victor crescent-wing four-jet bomber. The design envisages the use of four Rolls-Royce Conway engines of 17,250-lb thrust each, or units of a later type, fitted with thrust reversers and silencers.

Wing span with tip tanks is 130 ft, while the enlarged fuselage gives an overall length of 137 ft, 8 in. At a planned total weight of 80 tons, it can use short roughly-prepared air strips, and range is 3800 miles with a maximum load of 27 tons. As an airliner it could carry up to 168 passengers at a cruising speed of 544 mph.

Security controls were relaxed to permit de Havilland to display its Gyron Junior DGJ.10, an up-rated version of the 7000-lb thrust DGJ.1 first seen at Farnborough two years ago, which now powers the Blackburn NA.39. Although performance and weight details are still secret, it is known to be the same length (100 in.) as the earlier model and nearly three inches smaller in diameter.

New among the several rocket engines on show was the Napier Triple Scorpion, a three-barrel variant of the Double Scorpion using HTP as an oxidant and burning standard aviation gasoline or kerosene. It can fire its chambers simultaneously or singly in any combination, and can be stopped and restarted any number of times regardless of altitude. No performance figures have been quoted, but the unit is stated to weigh 295 lb, and to be 35 in. long, 21.5 in. wide and 17.75 in. high. It is intended for installation beneath the fuselage of the English Electric Lightning (formerly the Pl.B) supersonic fighter for very high altitude flying.

Outstanding among the missiles seen at Farnborough was the "stand-off bomb" developed by the Weapons Research Div. of A. V. Roe. Hung under the belly of an Avro Vulcan, this power-guided bomb, perhaps 35 ft long, was given only fleeting display during a flypast. The new weapon is designed to be carried part of the way to the target by a heavy bomber. It is then released to fly supersonically under its own power while guided by self-contained guidance equipment.

Other guided weapons on show included the de Havilland Firestreak airborne infra-red homer; the air-to-air beam-riding Fairey Fireflash powered by external boost rockets; the English Electric Thunderbird anti-aircraft missile with a rocket motor burning solid fuel; and the SX-A5 surface-to-air test vehicle designed to replace the 40-mm naval gun. ■

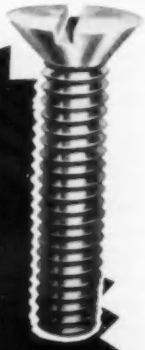
Lockheed Wins New Award For 26 P2V-7 Neptunes

Lockheed Aircraft Corp. has received $22 million Navy contract for 26 P2V-7 Neptune antisubmarine airplanes and equipment.

The contract—27th for the Neptune since the first model was built in 1944—will extend production at Lockheed's California division factories in Burbank through September of 1960. Previous orders involved production through September, 1959.

Neptunes currently in production will become additional units for the United States and French Navies. The big ASW airplanes have also been delivered to the military services of Great Britain, Australia, Canada, The Netherlands, and Japan.

PHILLIPS OR SLOTTED
MACHINE SCREWS
BY Southern



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Southern are specialists in quality fasteners— made in USA by USA workers, of USA materials. Every Southern machine screw and stove bolt meets or exceeds Federal or Phillips specifications.

Over one billion screws in stock. Four big, Southern warehouses* means right-now service!

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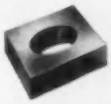
Highest Quality Hex or Square Steel Machine Screw Nuts



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Circle 144 on Inquiry Card for more data

Chrysler Imperial Assembly Facilities

(*Continued from page* 54)

nozzles, 22 directed to the underside of the vehicle. A new air conditioning conveyor will provide for 100 per cent installation of air conditioning units. It will facilitate the charging and testing of these units without interfering with the flow of cars on the final assembly line. Another first is claimed to be found in the high speed 180-deg turn, operating about 13 times as fast as the main conveyor line. Its purpose is to eliminate blocking of plant supply routes by assembly line units.

Imperial paint finishing requires an average of four gallons of primer, sealer, and finish coats. The cars have a range of 20 colors, process time in the paint department being around eight hours.

The general procedure in finishing Imperial bodies is given below:

1. Body shell given alkalai wash to remove foreign matter, two rinses in plain water, a phosphate coating, a cold water rinse, a chromic acid rinse to neutralize body residue.
2. All solder joints acid cleaned and rubbed with cloth ball.
3. All solder areas sprayed with clear epoxy to prevent mapping.
4. Metal imperfections knife glazed.
5. All interior and exterior body metal given two coats of epoxy primer.
6. Primer coats oven baked for 30 minutes at 350 F.
7. Complete body water-sanded with No. 360 fine sandpaper.
8. All joints sealed with vinyl and expandable sealer.
9. Top and bottom side of body and underside of all fenders coated with undercoating.
10. Coat of sealer applied to entire body.
11. Body again oven baked for 30 minutes at 250 F.
12. Complete body again water sanded using No. 400 very fine sandpaper.
13. Body completely rinsed with luke-warm water.
14. Body wiped with gasoline saturated rag, dry wiped, and cleaned off with turk cloths to eliminate all traces of dust.
15. Two complete coats of super high-baked enamel sprayed onto body wet on wet.
16. Body again oven baked for 30 minutes at 250 F.
17. Body quality inspected for imperfections and refinished where necessary.
18. Two coats of color tone applied over basic color coat to cars receiving two-tone treatment.
19. Body oven baked for 30 minutes at 250 F.

'59 Oldsmobiles

(*Continued from page* 63)

coil springs, a heavier stabilizer bar, and a change in king-pin angle which results in better control and steering ease. Rear leaf springs have been redesigned for an off-center mounting with a stiff, short section at the front and a longer rear section.

The propeller shaft is new, of two-piece, three bearing design. A dual exhaust system with resonators is optional on all series.

One of the major chassis features is the adoption of a new, rotary valve, inline type power steering gear which provides better and more positive control with about half the effort on the wheel. Steering gear ratio has been reduced to 17.5 to 1.

It is of interest that Oldsmobile has retained the basic features of its NewMatic air ride with its four air springs. However, the system has been improved in many details, including sturdier height control valves well protected from accidental damage, and the introduction of an automatic "spitter" valve on the storage tank to remove water continually.

An optional feature is the Anti-Spin differential, offered on all series.

Returning to body and interior features, one of the interesting items is found in the unique mounting of headlamps. They are placed horizontally and set wide apart with parking and turn signal lights located between each pair. Recesssed aluminum grilles are used on all models. Grilles on the 88's are stamped from aluminum sheet, while the grille for the 98 is an aluminum extrusion.

The Safety Sentinel warning signal again is offered as optional equipment. The dial is located on the speedometer face, calibrated for setting in 5-mph increments. When the maximum speed limit is reached, an amber light goes on and an automatic buzzer comes into play.

Power vent windows are available as optional equipment on Super 88 and 98 series only. A distinctive accessory is the push-button-operated dual-range power heater, providing instantaneous operation of heater, defroster, air conditioning, and ventilation. It also incorporates a two-speed blower control.

Fuel cells in the Boeing KC-135 jet tanker-transport are made of nylon fabric less than 1/16 in. thick. A fuel cell weighing 80 lb will hold seven tons of fuel.

•

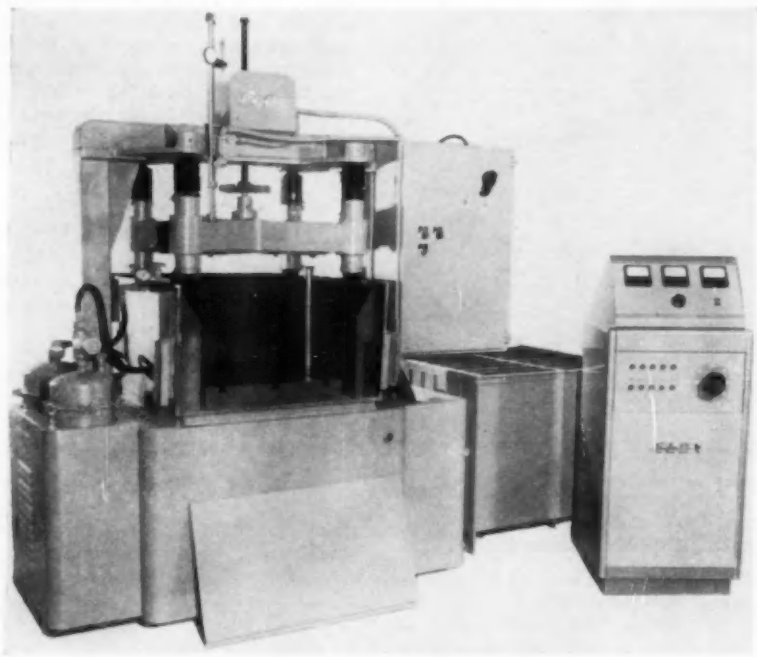
During 1957, the air transport industry took over first place among the common carriers competing for intercity passenger traffic. For the year, the airlines flew more than 25 billion passenger miles, compared with 21 billion for railroads and 16 billion for buses.

•

Free world supplies of nickel in 1957 totaled about 490 million pounds, a new record. This compares with the previous high of 450 million pounds in 1956 and 425 million in 1955.

NEW PRODUCTION and PLANT EQUIPMENT

FOR ADDITIONAL INFORMATION, please use reply card on PAGE 95



Elox Electro-Chemical Machining unit performs completely electronically

Electro-Chemical Machining

ELECTRO-CHEMICAL machining enables machining to be done from start to finish completely electronically. Using an electrode similar to that used in electrical discharge machining, with both electrode and work piece submerged in a saline solution, metal is removed by an electro-chemical action controlled by a servo feed system that automatically advances the electrode into the work piece as the machining progresses. The currents that can be used are unlimited and the gap between the electrode and the work piece that controls accuracy of the finished product has a low limit of 0.015 in.

Cost per cu-in. of metal is low since the electrode can be reused many times. The electrode can be made of any conductive material such as lead, tin, zinc, or solder. Machines are safe and simple to operate and little operator training is needed. *Elox Corp. of Michigan.*

Circle 60 on postcard for more data

Vacuum Coater

A SEVENTY-TWO inch vacuum coater with six stations which hold work pieces up to 22 by 50 in. assures the operator of full capacity production loads while metallizing larger items. A complete cycle, from inserting the work pieces into the vacuum chamber to removal of the coated item, can be made in nine minutes. The operating range for the LCI-72 extends from 5 to 10^{-5}mm Hg to 2 by 10^{-3}mm Hg. The complete vacuum cycle is semi-automatically controlled by a four-positioning switch on the control panel. *Consolidated Electrodynamics Corp.*

Circle 61 on postcard for more data

Electric Indicator

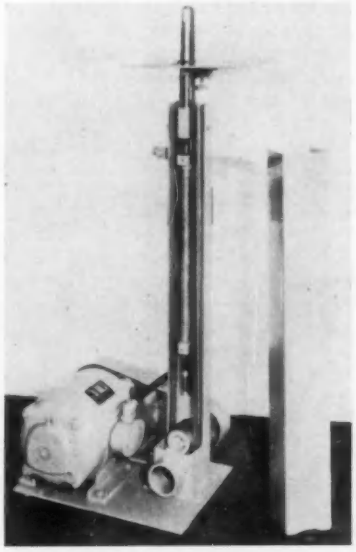
AN eccentricity indicator, called the Eccentricator, has been developed to indicate eccentricity, runout, lack of squareness, or wobble. Designated the Model A-93, it ignores normal piece to piece variation in size.

The indicator automatically indicates the extent of variation directly and is readily adaptable to automatic as well as manual inspection. *Federal Products Corp.*

Circle 62 on postcard for more data

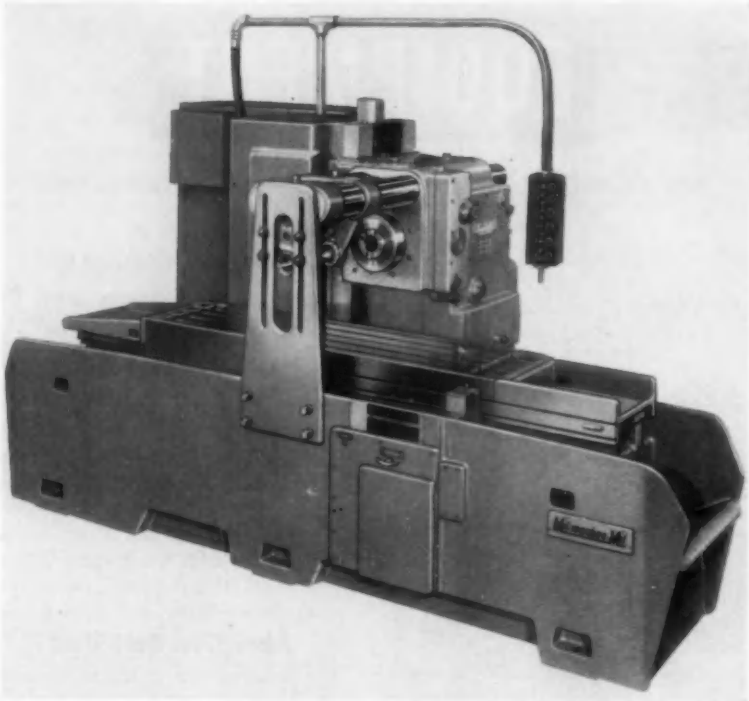
Abrasive Belt Unit

AN abrasive belt unit has been designed to grind inside surfaces where clearance is a major factor as well as to handle many types of small grinding operations. Named Model TS-90, it uses a 90-in. belt in widths of 1 or 2 in., which is suitable for use on metal, wood or plastics for the removal of flash or parting lines on non-ferrous castings, molded rubber and plastic parts and for sharpening special shape dies. *Grinding & Polishing Machinery Corp.*



Model TS-90 abrasive belt unit

Circle 63 on postcard for more data



Mil-waukee-Mil designed by Kearney & Trecker for automatic production milling

Bed Type Automatic Milling Machine

THE Mil-waukee-Mil is a bed type milling machine which provides automatic production milling by dialing the results directly from the blueprint ahead of time. The operator merely dial-programs machine functions on the Dial-a-Cycle control panel, by means of phase-switch dials, which control each machine function automatically.

Any number of functions can be phased into a cycle, including automatic quill retraction, rise and fall to the head, and tracer control. *Kearney & Trecker Corp.*

Circle 64 on postcard for more data

Two-Speed Clutch

A TWO-SPEED clutch, split into two separate clutches mounted on opposing sides of a press, has been designed and installed on a standard two-point 600-ton eccentric draw press. The press is used to form automobile rear suspension brackets at the rate of 448 double pieces per hour.

The clutch permits three operational speeds and takes advantage of maximum approach and return speeds, while permitting slow speeds for drawing operations. Speeds of 10, 16, and 20 spm are possible by using the clutch units separately or in combination. With the fast clutch alone the press operates at 20 spm; with the slow clutch alone, at 10 spm. *E. W. Bliss Co.*

Circle 65 on postcard for more data

Welding Fixture

A LINE of welding fixtures, or bucks, for use in portable gun welding of parts, features light weight rigid construction, and the frame is of a fabricated square steel tubing construction.

The contour form locators are built up of plastics and consist of a number of pads around the outside edges of the assembly and along the welding seam and wherever the necessary intermediate spots are required. *The Federal Machine and Welder Co.*

Circle 66 on postcard for more data

Slow-Speed Attachment

AN attachment which permits machine tool operations requiring slow speeds and positive drive on a 20-in. drill press has been introduced by Rockwell Mfg. Co. The attachment provides smooth, high torque, power transmission for a variety of operations such as spot-facing, reaming, counterboring, core drilling, and cutting wooden plugs.

The attachment is available to fit 20-in. Delta drill presses having either No. 2 or No. 3 Morse taper spindles, and for use with cutting tools having either No. 2 or No. 3 Morse taper shanks. *Rockwell Mfg. Co., Delta Power Tool Div.*

Circle 67 on postcard for more data

Insert Toolholders

FIFTY-FOUR different positive rake disposable insert toolholders, both left and right hand, and in a variety of shank sizes have been added to the line offered by the Metallurgical Products Dept. of General Electric Co.

The new line will accept standard disposable triangular inserts ⅜ to ½

GE positive rake toolholder

in. inscribed circle, ⅛ or 3/16 in. thick. Square inserts can also be used, ⅜ to ¾ in. square and ⅛ to 3/16 in thick.

Circle 68 on postcard for more data

Clearance Comparator

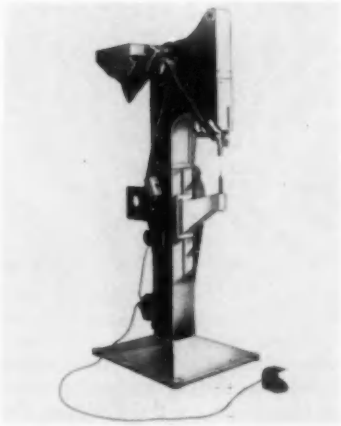
THE Air-O-Limit three station ID-OD clearance comparator checks the clearances between the ID and OD of mating parts to millionths of an inch. It is designed for checking precision mechanisms, such as servo valves.

It is a combination of two standard gaging units plus a computing circuit. In operation, the output of the two units is fed into a computing relay, and the clearance or interference between the two parts is read on the clearance indicator in the center of the gage. *Pratt & Whitney Co., Inc.*

Circle 69 on postcard for more data

Long Stroke Riveter

MODEL 423 long stroke riveting machine will handle and set long rivets of tubular and semi-tubular type in metal, industrial wheels and furniture, and other products fabricated or molded of metal or plastics. It will set rivets up to ¼ in. in diameter and 2⅜ in. long. Rivets are fed automatically to the work when the foot or palm switch controlling



Milford long stroke riveting machine

the single revolution clutch is pressed. Throat depth is 12 in., stroke is 5½ in. *The Milford Rivet & Machine Co.*

Circle 70 on postcard for more data

Atmosphere Box Furnace

AN atmosphere box furnace has been developed for continuous operation at all heat levels up to 2000 F. The chamber dimensions are 8 in. wide by 13 in. deep by 5 in high. All electrical components and controls are mounted in the furnace base and completely prewired and piped. Furnace chamber is protected by an automatic flame curtain which ignites when the furnace door begins to open. *Lindberg Engineering Co.*

Circle 71 on postcard for more data

Drum Vacuum Cleaner

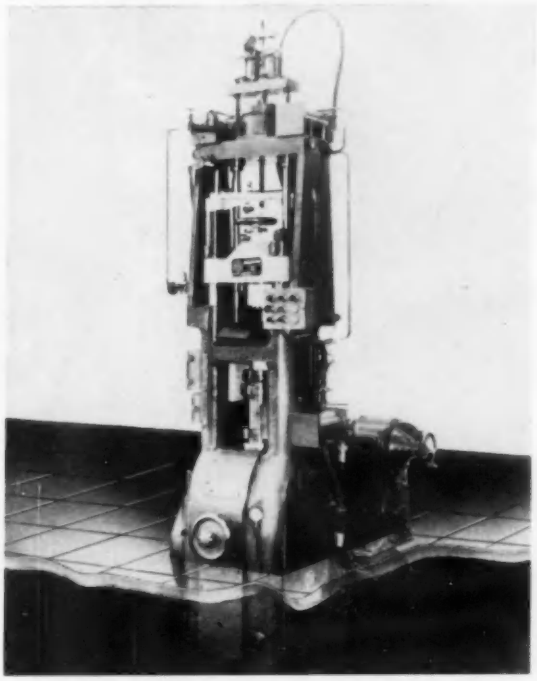
A HEAVY-DUTY drum vacuum cleaner has been designed to attach to any open-head 55-gal drum to give a full pick-up capacity of 48 gal dry or 40 gal wet material. It is powered by a special 1¼ hp vacuum cleaner motor, sealed against dirt and water, which drives a 2-stage turbine-type centrifugal fan. *The Black & Decker Mfg. Co.*

Circle 72 on postcard for more data

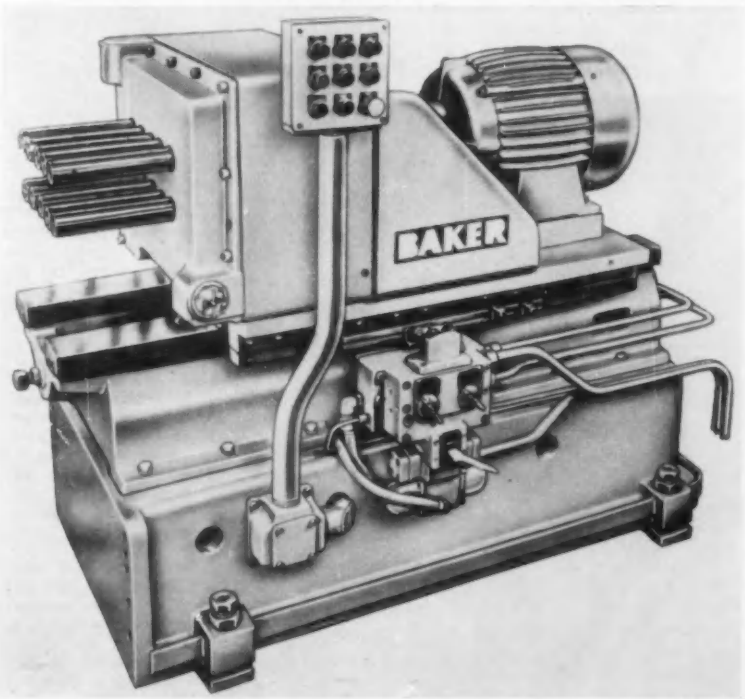
Seventy-Five Ton Compacting Press

This Baldwin 75-ton compacting press was designed for compacting such materials as powdered metals, abrasives, carbides, cements, ferrites, nuclear and other solid fuels for rockets and missiles. Named model 75-A, the press uses a separate die holder and has an upper housing design so that the feeder is connected directly to the die holder. The shuttle feeder has spring-loaded cutoff rings between shuttle and hopper and between shuttle and die surface to cut powder loss to a minimum. Press accessories include an arrangement for holding the top punch against the part during ejection to prevent laminations or shear cracks. (Baldwin-Lima-Hamilton Corp.)

Circle 73 on postcard for more data



Horizontal Drilling, Tapping Unit With Fixed Head



Shown is a Baker hydraulic horizontal milling machine. It is designed to accommodate any of approximately 27 fixed center heads. All electrical and hydraulic controls are located on the outside of the unit. (Baker Brothers, Inc.)

Circle 74 on postcard for more data

NEW PRODUCTION and PLANT EQUIPMENT

Wide Range Optical Comparator Inspects Heavy Parts

This Model FC-30ER features 80 sq-in. of measuring area and is designed as a standard machine that will inspect extra-large, heavy parts. Up to 10 in. of lateral measurement is provided with a roller mounted, heavy duty table. The double spindle table support permits up to 8 in. of vertical measurement. This double spindle construction combined with the 8 by 32 in. table provides sufficient rigidity for movement and measuring of heavy objects weighing 200 lb and more. It is possible to project over and under objects up to 8 in. in diameter without interference with either the lens or viewing screen. The operator can also control screen contrast. (Jones & Lamson Machine Co.)

Circle 75 on postcard for more data

Heavy Duty 20 Cubic Foot Blast Cleaning Barrel

This Pangborn heavy duty 20 cubic-foot Rotoblast barrel is designed to increase production and lower production costs while maintaining high cleaning efficiency. The barrel, named Type 20 GN, features a 30 hp motor which allows the wheel to throw 50,000 lb of abrasive per hour for rapid blast cleaning. The extra-heavy work conveyor allows loads up to 3500 lb, with single pieces weighing up to 800 lb each, to be handled in the machine. A quick-acting work loader, with double cables for safety, delivers each batch into the machine. Control is from a panel mounted alongside the cleaning chamber opening. (Pangborn Corp.)

Circle 76 on postcard for more data

As a result of the record breaking deficit in the current fiscal year — conservatively figured to run to a peace-time high of $12.2-billion—the Eisenhower Administration has already started to tighten up its spending. A cut of 2 per cent in the number of people on the Government payroll has been ordered—to be accomplished by not refilling jobs rather than by dismissals.

In addition, some $1.7 billion in extra spending authority voted by Congress for the Defense Department has been frozen, at least for the time being. This extra authority would have gone for extra missile submarines, some research and development programs, and some troop increases.

No other spending freezes are planned "at this time," according to budget Director Maurice H. Stans. But he indicates that firm orders have been given to all agencies to hold strictly within their original spending estimates.

The money experts say that $80-billion-plus national budgets are here to stay. Here's how they figure it: More than than 77 per cent of the Federal budget is for past, present, or future wars, plus interest on the Federal debt. And none of this can be cut, according to the planners.

So the answer is higher taxes. What kind? They're not ready to say yet. But it is a foregone conclusion that they'll step up their demands for more "user charges," such as increased rates on aircraft using Government airports, stiffer fees for the services of such Government agencies as the Securities and Exchange Commission, and possibly still another bid for increasing postal rates.

NEW PRODUCTS AUTOMOTIVE-AVIATION

FOR ADDITIONAL INFORMATION, please use reply card on PAGE 95

Lift Truck Cylinders

Four multiple service lift truck cylinders have been added to the standard line of Prest-O-Lite cylinders made by Linde Co., Div. of Union Carbide Corp.

All four cylinders can be mounted in either vertical or horizontal position, and the 14 and 20 lb sizes can be easily changed from liquid to vapor service. Changeover can be made without additional fittings. They come equipped with a dual float gage which contains a dial with both vertical and horizontal scales. The scales are calibrated to show the gas contents remaining in the cylinder on the basis of per cent of full cylinder capacity.

Circle 90 on postcard for more data

Filter Unit

This Bendix filter unit serves as both a combination filler cap and breather filter for hydraulic fluid, fuel and oil reservoirs. Designated as Model 1990-A, bayonet-type breather filter, the unit is designed to provide positive protection against airborne contamination that can damage such system components as pumps or valves. The filter measures

2 9/16 in. in diameter by 1½ in. high. *Bendix Filter Div., Bendix Aviation Corp.*

Circle 91 on postcard for more data

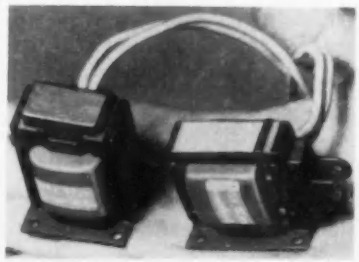
Emergency Markers

A line of exit and emergency markers for installation in aircraft have been designed which require no electrical connection or other external power source. Each unit is completely self-contained, utilizing a glass tube which is internally coated with a special phosphor and then filled with tritium gas. When the coating is excited by the gas, light is emitted. *United States Radium Corp.*

Circle 92 on postcard for more data

Long-Lasting Solenoid

Pictured is a long-lasting solenoid made by the Detroit Coil Co. from silicon steel produced by the Alle-



gheny Ludlum Steel Corp. It was designed to work along uninterrupted cycles for industry without breakdown periods. The series is produced in either the push or pull type, vertical or horizontal type mounting, and is capable of producing 1.7 lb force at ½ in. stroke and holding closed quietly when opposed by 4¾ lb force. *Allegheny Ludlum Steel Corp.*

Circle 93 on postcard for more data

Double Ended Motor

Lear-Romec Model RG-18130 consists of a double ended motor driving an oil-free reciprocating air compressor and an oil-wetted rotary vacuum pump. The air compressor has an oil-free carbon graphite composition sleeve shrunk into its steel cylinder. The steel piston maintains a close running fit on the self-lubricating cylinder sleeve and seals against leakage without the aid of piston rings. The unit will deliver 450 cipm of free air at 30 psi gage discharge pressure and operate with pressures up to 65 psi gage.

The vacuum pump has an ultimate vacuum of 0.20 in. Hg abs or 600 cipm flow with 10 in. Hg abs inlet pressure, and will operate in ambient temperature ranging from —65 to 140 F. The motor is 0.025 hp at 3600/3800 rpm, 115 v and is rated for continuous duty. *Lear-Romec Div., Lear, Inc.*

Circle 94 on postcard for more data

Automotive Fuel Control

The ACon-o-Mizer is a fuel pressure regulator which is mounted between the fuel pump and carburetor. It is designed to save gas, boost engine performance, and stop flooding and stalling. The regulator cuts fuel pressure at idling or normal cruising speeds and increases pressure when it is needed for extra bursts of power.

Gasoline from the fuel pump enters a built-in strainer in the base of the unit. The gas leaves this chamber and passes into the carburetor fuel line through a controlled valve opening. Fuel, exerting pressure on the under side of a lower diaphragm,

compresses a spring and tends to close the valve. This restricts the flow of gasoline. The consequent reduced fuel pressure then tends to permit the valve to open again. The balanced condition that results produces a pressure of 1¾ pounds under normal operations. *AC Spark Plug Div. of General Motors.*

Circle 95 on postcard for more data

METALS

(*Continued from page* 74)

turn downward since November, 1956. The rise in domestic deliveries is the more significant because it did not include any shipments to the Government stockpile, whch ended four months ago. It is also gratifying that exports picked up sharply to nearly 600 tons, contrasting sharply with nearly negligible exports the last six months.

The feeling in the trade is that zinc has quite definitely turned the corner and demand is on the upgrade. Sharp cutbacks in mine and smelter output have reduced production to less than 63,000 tons per month, compared with a monthly average in 1957 of 88,100 tons. Worth emphasizing is the stability of the zinc price at 10 cents a pound, unchanged for well over 14 months.

Tin Situation Unsettled

The tin situation is in a muddled state, with open doubt whether the Buffer Pool in London will be able indefinitely to maintain the agreed price of 91¼ cents a pound for the metal. Continuing large Russian shipments into world markets and the lack of any sustained buying by consumers have shaken confidence. Early in September the British Government announced a limit of 750 tons each quarter on imports originating in Russia — it was formerly 2090 tons in the second quarter — and the price strengthened, only to slide off again when the Soviet got around the restrictions by selling tin on the Continent. To make matters worse, demand from U. S. has been slow because of the business recession. The combined factors, instability of demand and heavy pressure of Russian tin on world markets have started reports that the Buffer Pool may be obliged to lower the floor price to 80 cents in order to conserve its resources.

Aluminum Cans Compete

The advent of aluminum cans in entering the container field, traditionally the stronghold of tin, has done nothing to allay the worries of the producers. Continental Can has announced it will sell aluminum cans to several motor oil marketers, to be priced competitively with ordinary tin-plated steel cans. Other end-uses of tin have declined, notably in the automobile industry because of the cutbacks in Detroit's production. Requirements for strategic stockpiles of tin here and abroad have been lessened. The United States is known to have accumulated a huge surplus and further additions won't be made. However, it is understood that this country, while not a member of the Buffer Pool, will take no steps to disrupt its normal functioning, and as most of its tin was acquired at much higher prices, it has a definite interest in seeing that the present price level is maintained.

Kennecott, Phelps Dodge, Raise Mine Output of Copper

Defeat of the Seaton Bill to stockpile 150,000 tons of domestically-produced copper at a price not to exceed 27½ cents a pound ended all hope of financial aid from the Government this year for the copper producers, and rather effectively spiked any expectation of an immediate rise in the copper price that was so confidently counted upon had the stockpiling program won approval.

On the very eve of the balloting in the House on the Seaton Bill, Kennecott Copper announced a 12 per cent increase would be put into effect at its Western mines, and this, coupled with an earlier announcement of an increase, no doubt influenced an economy-minded Congress to vote against the Bill, on the ground that if the copper demand was showing such material improvement that output could be increased by 7500 tons a month, then it didn't need any Government help.

A week later Phelps Dodge, second largest U. S. producer, reversed its curtailment policy and put its mines back on a five day week, thereby raising its output about 3500 tons a month. No announcement of increasing production was made by mid-September, but it appears likely this may follow.

Copper Demand Stronger

Kennecott officials declared they had increased production because of stronger demand, improved inventory position, and the need to increase exports to Europe. This is substantial evidence that copper has measureably improved its position, thanks in part to the very curtailment that now seems on the way out. Whether demand will keep pace with increased production while very heavy stocks on metal are still in producers hands remains to be seen.

Custom smelters almost immediately cut their price for copper by ½ cent, following demise of the Seaton Bill and prices weakened in London. Scrap was reduced the same amount. However, within a week the custom smelters raised back to 26¼ cents and London held astonishingly firm above the critical 25 cent level. Russian purchases were given as one reason for strength, uneasiness over the Far East situation, and possible labor trouble in Rhodesia were contributing factors.

Continued call for copper from industry will probably parallel the steel operating rate, which recently gives every evidence of rising sharply in the fourth quarter. An automobile strike would undoubtedly halt the recovery temporarily but its termination would probably be followed by a rush to get both steel and copper. Hence the outlook is for a firm copper price, with a possible modest improvement before the year end.

It caused no special surprise that the U. N. parley in London agreed that no move is required at this time for inter-governmental action on copper. The reason given was that the copper outlook was favorable for balancing demand and supply, and requred no price-fixing agreement. ■

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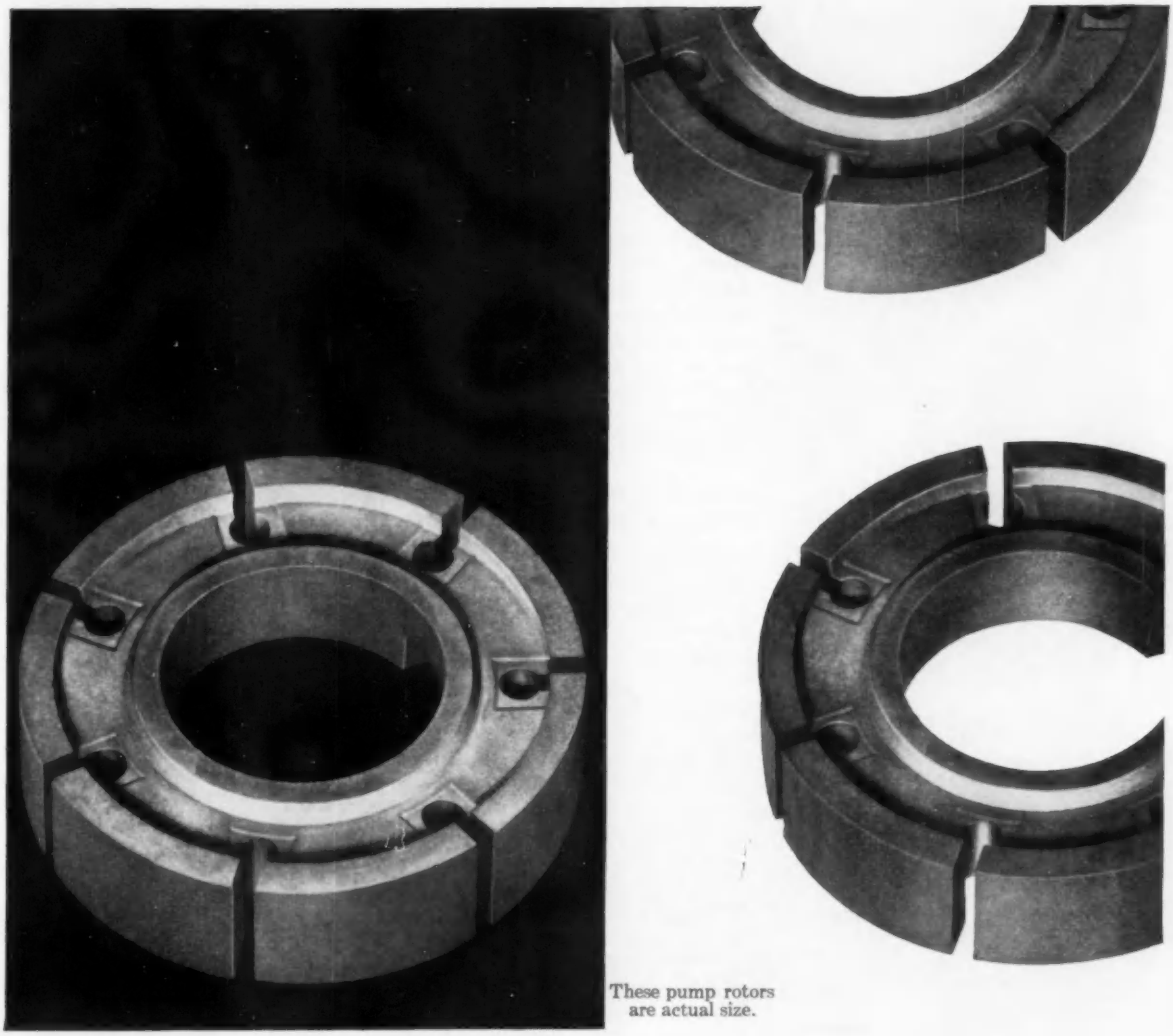

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Moraine Products also produces: Moraine Power Brakes • Delco hydraulic brake fluids, brake assemblies, master cylinders, wheel cylinders, and parts • Moraine friction materials • Moraine-400 and M-100 automotive engine bearings • self-lubricating bearings and porous metal filters • rolled bronze and bi-metal bushings.

Moraine Products
Division of General Motors, Dayton, Ohio

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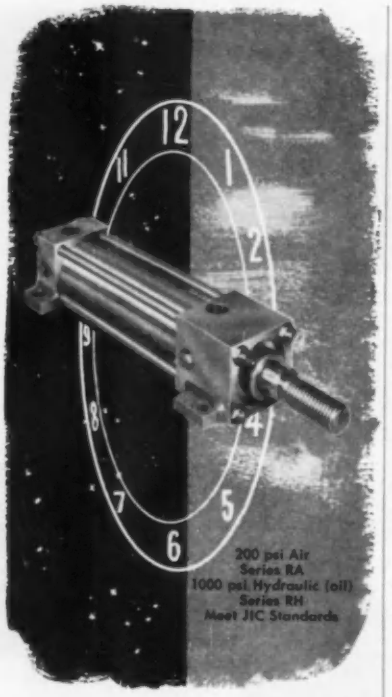

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heavy-duty air and hydraulic cylinders

O-M Automation Air and Hydraulic Heavy-duty Cylinders are the result of years of research and engineering "know-how". Designed to the automotive industry's Automation Standards, they fill a definite need for outstanding durability under the most exacting demands of today's high speed automatic production.

Tested, tried and proved in actual service, these ruggedly constructed components hold untold promise for design engineers who seek to combine continuous, smooth dependable and efficient straight line motion with long life and minimum maintenance. Available in 1½" to 8" bores with front flange, rear flange, clevis, trunion or foot mount.

These and many other advanced features of O-M Automation Cylinders, that make for maximum efficiency and long life with minimum servicing, are described in our new catalogues—107 for Air Cylinders—108 for Hydraulic Cylinders. Write for your copy TODAY!

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AUTOMATION News Report

(*Continued from page* 66)

and finally the billing for the shipment.

The teletype system, which uses about 13,000 miles of leased private wire, permits orders to be received within minutes from the time they are placed with the dealers, and the efficient materials handling system and data processing equipment makes same-day shipment possible.

HIGH-PERFORMANCE POWER TRANSISTOR

Bendix Aviation Corp. announced it has developed a new power transistor by combining the diffusion technique with the alloy technique of manufacturing.

Dr. W. C. Caldwell, manager of the semiconductor products plant of the company's Red Bank Div., said the diffusion technique was used to apply the impurity doping material to the emitter side of the germanium wafer. This results in an area of low resistance next to the emitter junction. The diffused germanium material is then alloyed, using a standard technique.

Bendix engineers said that one of the principal applications of the new transistor will be in the computer field, because of its quick response. DAP can record and recall numbers from computer memories at a rate of more than one million per second—five times faster than is possible with present transistors.

Caldwell said DAP resulted from a team research effort by engineers at the semiconductor products plant in Long Branch, N. J., and at the Research Laboratories Div. in Detroit. ■

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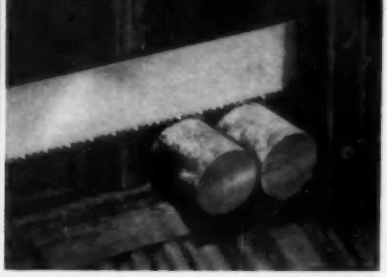

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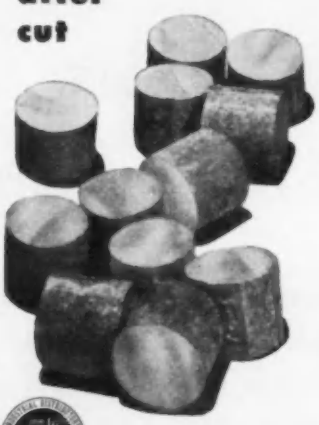

See Your Capewell Distributor

CAPEWELL

THE CAPEWELL MFG. CO.
HARTFORD 2, CONN.

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Special Handling Equipment for Crated Motor Vehicles

(*Continued from page 67*)

radiator and grille are removed. This leaves only the chassis with engine attached. Measurements of the chassis-and-engine unit determine the dimensions of the crate which will be built around it. All other components except the cab are packed around the chassis.

The cab, meanwhile, has been swung by crane to a second, shorter crating line paralleling the first. Cabs are packed two to a crate, along with some odds and ends not included in the chassis crate.

Crates for both the chassis and cabs are built around the unit as it proceeds down the line. At the chassis line, for example, boards are nailed together to form the base of the crate. This is set on the drag line, and the chassis placed on it. Sides of the crate are built up as other components are packed. Finally the top is formed and nailed on.

During all of this disassembly and crating, Aacon crews use a variety of cranes and hoists and a great number of air-powered hand tools such as wrenches, screw drivers and hammers.

Once a truck is crated there remains the task of handling the crate from the plant to a storage area and then to the piers.

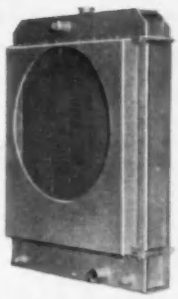
Crate handling is accomplished with two straddle carriers and several fork trucks. The carriers, called "pivot hook" carriers, were designed for Aacon by the Industrial Truck Division of Clark Equipment Co. Rather than regular load hooks, the carriers have four forks, two on each side, which swing in at right angles and meet in the center to form two arms under the load. This arrangement permits carrying loads without the bolsters normally required.

To allow bolster-less handling, an air-operated platform lift was installed at the end of the chassis drag line. As the system operates, one end of the chassis crate is mechanically pushed onto the platform lift. The lift is then raised a few inches to give clearance under the crate for the carrier's hooks. The carrier operator backs the machine over the crate, actuates the hook control, and the pivot hooks swing open under the case. The platform lift is lowered, leaving the case resting on the carrier's hooks.

Moving the case to the storage yard is accomplished quickly. Since the carrier handles its load parallel to the route traveled it moves through the yard and out the gate without regard to width dimensions. Traveling on cobblestone streets and the bumpy storage yard is faster and safer because the load is more evenly distributed. The carrier deposits its load on dunnage, to be tiered or truck-loaded later by a fork truck. ■

Young designs special radiator with built-in oil cooler for Huge New Tractor-Scraper

Clark Equipment Company's Michigan Model 310 Scraper.



MONO-WELD® Radiator by **Young**

Cools both water and oil under toughest operating conditions

Rear view of radiator shows connections for oil cooling.

Cooling giants like this Michigan Model 310 scraper is a job calling for Young radiators. By designing a radiator with a special core section at the bottom equipped with patented turbulators for cooling the lube oil, Young eliminated the need for a separate oil cooler. Special construction features of the Mono-Weld Radiator insure maximum heat transfer and dependable ruggedness to match the superior construction of this equipment.

Young radiators are used where the going is tough

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Executive Office: Racine, Wisconsin, Plants at Racine, Wisconsin, Mattoon, Illinois

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MACHINERY NEWS

(*Continued from page* 70)

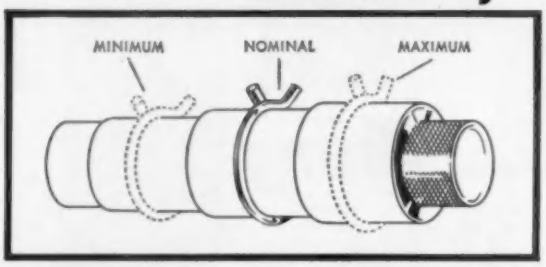
Vee Bee Mfg. Co. of Muskegon, Mich., a new firm in the field, has started production of boring bars and cutters for metalworking applications. The line will feature heat treated, high alloy steel bars with generous chip clearance and drive flats on shank in either straight shank or Morse taper models. Cutters will be interchangeable without removing bar from the machine. Rough boring, finish boring, and combination tools will be included in the line.

Foote Bros. Gear & Machine Corp.—The election of Irwin Koenig as vice-president and director of engineering has been announced.

Pendleton Tool Industries, Inc.—Marvin S. Bandoli has been elected senior vice-president.

EXECUTIVES READ
AUTOMOTIVE INDUSTRIES

Constant Concentricity



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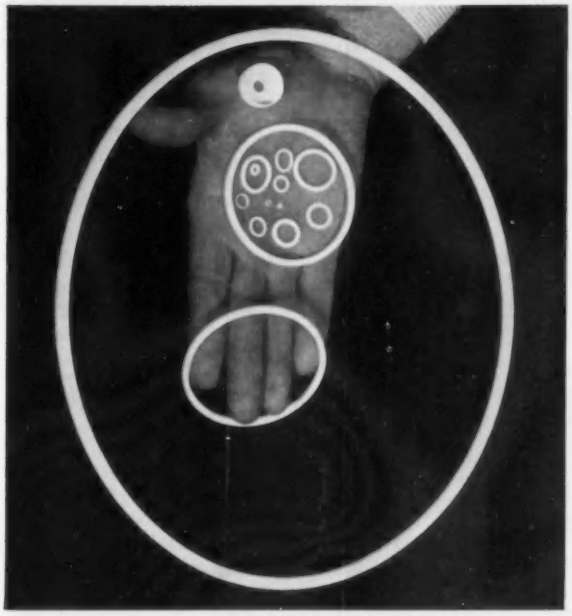

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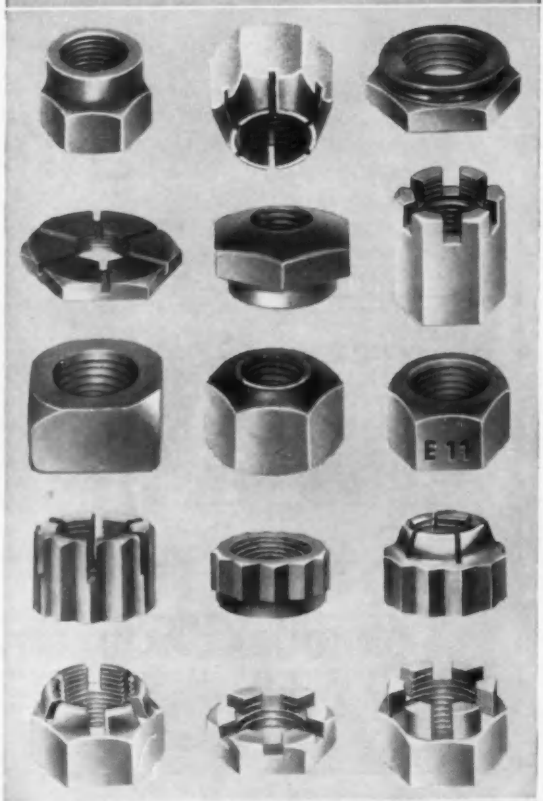
to specs. 7/16"—4¼" cross flats

special machines + large stock of material × years of experience = speedy deliveries high quality low prices



Here are a few samples made to customers specifications . . Our batteries of special high-speed multi-spindle, automatic machines make possible fast and accurate production of hexagon nuts of non-standard height and special shape from carbon or alloy steel, Naval bronze or other non-ferrous metals; also AN 310 through AN 335 as per latest Airforce specifications. Very often the special nut you require may be similar to one we are already making and a simple modification would result in a price advantage and quicker deliveries to you . . Send us your blueprint and particulars —let us quote on your requirements . . We also have a catalog that contains complete specifications, engineering data and prices regarding our standard nuts.

*12 Pointer Standards, sizes: ¼" to ¾"—brochure on request

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*Manufacturer of Standard and Special *12 Pointer and Hexagon Nuts . . . "Huglock" and "Marsden" locknuts.*

44225 Utica Rd., UTICA, Michigan

SPS/COMPANY

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Polish Truck Factory

(*Continued from page* 65)

fer machine for engine cylinder heads. Operations cover drilling, boring, and reaming the work from both sides; transfer is mechanical, and the unit includes a continuous chip conveyor under the rails.

British equipment features prominently in the section for machining cylinder blocks, where there are several dozen Archdale multi-spindle and radial drills. This complete line was supplied by Archdale in 1949, and was designed and tooled to drawings supplied from Starachowice. Some Churchill grinders were bought at the same time. Purchases from Britain dwindled after that as a result of the western embargo on shipments to Communist states. Now with the easing of restrictions the Poles hope to buy more such equipment.

Yet there are several cases of western machines obtained during the past few years. A Drummond Maximatic for turning crankshaft main bearing journals and crank pins was installed in 1953. Crankshaft bearings are hardened on a modern Alfing semi-automatic machine with induction heating equipment by A.E.G.-Elotherm. New Fiat machines are used for cutting timing gears.

Polish equipment and methods predominate, however, and one instance of unusual production technique is the forging of connecting rods in opposed pairs in order to give symmetrical loading on the dies. These are then split at the common lower end faces on a universal miller with work carried on a trunnion-mounted, four-sided fixture. Bearing caps are a circular forging separated in the same way.

Assembled engines with transmissions attached are checked, flushed and initially run in the test bay with 20 beds. There they are placed back-to-back in ten pairs, with opposing gearboxes coupled by jointed shafts. Each engine is first motored for 1½ hours, after which the mated driving unit is replaced by a new one. This in turn is driven by the first, now running under its own power, for the same length of time. The system is claimed to eliminate the need both for electric motors and for brakes.

Future plans at Starachowice include building a new machine shop for the projected Diesel engine. Until recently a licensing agreement to make a British engine was considered, but it is believed that this idea has now been dropped, and that a locally-designed unit will be produced. The main problem would be in meeting western specifications for materials and precision components like bearings and fuel injection equipment. For example, it was stated that even on the present vehicle, castings for some components are made heavier than necessary because of inadequate size control stemming from wide variations in foundry sand. Thus Polish engineers feel it would be easier to manufacture an engine designed according to available production techniques than to make a foreign unit that would be difficult to reproduce. ■

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Tulsa Winch
TULSA, OKLAHOMA
DIVISION OF VICKERS Inc
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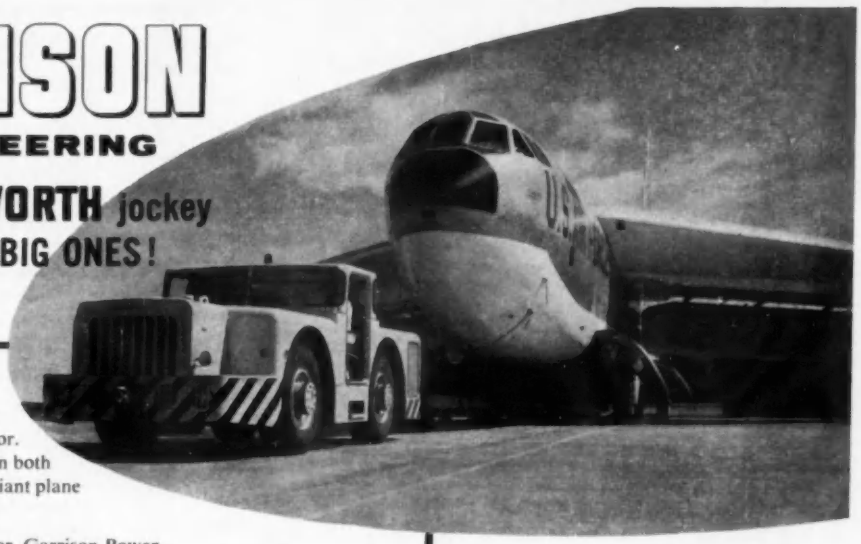
GARRISON
POWER STEERING

helps this **KENWORTH** jockey the BIG ONES!



Handling big tow loads like the Boeing 707 is made to order for this Kenworth Towing Tractor. With Garrison Power Steering on both front and rear wheels even this giant plane is jockeyed like a baby buggy.

On the Kenworth Towing Tractor, Garrison Power Steering provides maximum ease of handling and unusual maneuverability. It supplies a choice of two-wheel steering and four-wheel steering, or oblique (crab) steering merely by changing a selector. With 80% of the effort supplied by the Garrison hydraulic cylinders, operators get jobs done safer, faster, and with less strain on both men and machines!

Ask how your steering problem may be solved for easier operation and greater efficiency with GARRISON POWER STEERING... available for medium and heavy trucks, truck cranes, motor graders, wheeled material-handling, off-the-road equipment and specialized vehicles.

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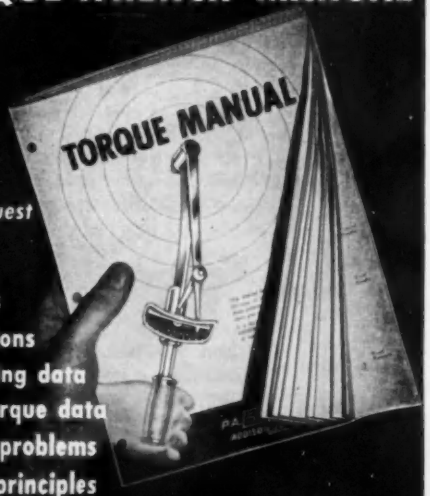
"TORQUE WRENCH" MANUAL



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General principles

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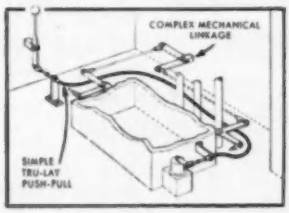
TRU-LAY PUSH-PULL DATA FILE SHOWS HOW TO SIMPLIFY AND IMPROVE DESIGN



Push-Pull remote controls, shown here, are flexible, have but one moving part, and give a lifetime of accuracy. Mechanical linkages are complex, are made of many parts, wear at many points, and produce increased backlash, lost accuracy, and vibration rattles.

This Push-Pull Data File—containing 7 engineering bulletins—will show you how these flexible controls have eliminated mechanical linkages on hundreds of products. You can make *your* products more useful, easier to sell, with Push-Pull controls. Write for your Data File today.

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FREE LITERATURE

Die Casting Machines 1

The Cleveland Automatic Machine Co. has issued a bulletin containing detailed descriptions and specifications of a line of high-pressure hydraulic die casting machines ranging in locking pressures from 50 to 1000 tons.

Boring Machines 2

Ex-Cell-O way type precision boring machines are explained and described in Bulletin 312081. Machines of the one, two, three and four-way types are included. *Ex-Cell-O Corp.*

Explosive Valves 3

Catalog 5808-XV, 16 pages, describes and illustrates the complete standard line of Conax explosive valves, latch pins, actuators, and thermocouple and pressure sealing assemblies. *Conax Corp.*

Hot Press Equipment 4

Construction features of a line of hydraulic hot presses with applications in the aircraft, automotive, and metal working industries are presented in a new bulletin prepared by *Berthelsen Engineering Wks., Inc.*

Storage Racks 5

A pictorial presentation of some of the many uses to which adjustable storage racks are being put in industry is contained in a new brochure published by the *Palmer-Shille Co.*

Operatorless Tractor 6

Bulletin 586 presents information on the Guide-O-Matic operatorless tractor. The Guide-O-Matic is a battery powered electronically controlled tractor that tows trailer trucks over pre-determined routes without an operator. *Barrett-Cravens Co.*

Oscillographs, Amplifiers 7

Bulletin 210, eight pages, provides detailed information including engineering specifications, electrical characteristics, and construction of direct-writing oscillographs and associated amplifiers offered by *Photron Instrument Co.*

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FREE LITERATURE—*Continued*

Steel Tubing 8

Catalog CS-59, eight pages, covers a line of seamless and electric-resistance welded steel tubing in mechanical, aircraft mechanical, airframe, and pressure grades. *Ohio Seamless Tube Div., Copperweld Steel Co.*

Speed Reducers 9

Book 2618, 24 pages, contains engineering and selection information on: single reduction drives in six series, with nominal ratios of 5 to 1 and capacities up to 50 hp; and double reduction drives in seven sizes, with norminal ratios of 15 to 1 and up to 40 hp. *Link-Belt Co.*

Terminal Blocks 10

An illustrated six page brochure gives specifications, outline dimensions, and general information on terminal blocks for computer applications. *DeJur-Amsco Corp.*

Analog Computer 11

The Mid-Century MC-5800 Master Precision Analog Computer is described and illustrated in an 18 page brochure prepared by the *Mid-Century Instrumatic Corp.*

Heat-Transfer Material 12

Dowtherm 209, designed for use in ebullient cooling—cooling by means of a boiling heat-transfer medium—is described in Form 164-79. Dowtherm 209 is expected to find immediate use in cooling large, stationary internal combustion engines. *The Dow Chemical Co.*

Welding Wire 13

Bulletin DH-402B, four pages, describes Page Automatic Welding Wire for inert gas and submerged arc welding processes. *Page Steel & Wire Div., American Chain & Cable Co., Inc.*

Helixpoint Drills 14

Helixpoint Drills as produced on the Steptool Relief Grinding Fixture are covered in a four page bulletin. The bulletin covers two case histories of performance and describes the grinding fixture used for grinding Helixpoints on drills from No. 80 through 1 in. diameter. *Steptool Corp.*

Automator Units 15

A three-element Automator unit to provide DC variable speed drive from an AC network is described in Bulletin SB-183. *Marathon Electric Corp.*

Carbide Gun Drills 16

Catalog SC-110, four pages, covers Starbore carbide gun drills for high speed production of precision holes from the solid. *Star Cutter Co.*

Magnetic Rubber 17

Bulletin 58, four pages, describes Denmag, a flexible magnetic material, resistant to oils and acids, available in molded or sheet form. It gives basic characteristics and properties of the material, and illustrates some typical applications. *Denman Rubber Co.*

Valves and Fittings 18

A full line of midget valves and fittings, which offer a wide range of mechanical seals and controls, is described in Catalog 658. *High Pressure Equipment Co.*

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FREE LITERATURE—
continued

Forging Dies 19

Bulletin 56, four pages, includes information on Mackintosh-Hempill cast forging dies and auxiliaries. Mack-Hemp cogging hammer dies, cogging press dies, sow blocks and anvil bases, with suggestions on selecting the proper surface hardness and alloys. *E. W. Bliss Co., Mackintosh-Hempill Div.*

Servo Amplifiers 20

Bulletin 501-2 describes the complete performance specifications, and application data of Librascope's Transistor Servo Amplifier, Model 501-2. The unit is designed for controlling servo motors in high-performance instrument control systems. *Librascope, Inc.*

Actuators 21

The Hoover Electric Co. has published an electro-mechanical glossary which outlines some of the advantages of electro-mechanical control. Included are definitions of some of the terms used in this field.

Thermocouple Devices 22

Catalog 1885, 36 pages, fully illustrates the line of thermocouple assemblies and pressure sealing glands manufactured by *Conax Corp.*

Environmental Chamber 23

A 27 page bulletin is available from Webber Engineering Corp. which lists and describes a line of environmental chambers for producing controlled atmospheric conditions.

Gearshift Drive 24

Bulletin OEM-DB, eight pages, covers the construction and typical applications of Lima Gearshift Drives, also shows original equipment photos and gives comparative data between Lima "Selective-Speed" Gearshift Drives and other types of drives. *The Lima Electric Motor Co., Inc.*

(Please turn page)

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241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260
261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	780
281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300

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Aluminum Stud Cap 26

Form 8-437 describes the new Huck aluminum stud cap which is a wide-flanged, threadless cap of aluminum alloy for use with specially designed annular locking grooves. *Huck Mfg. Co.*

Dust Collector 27

Bulletin J-616, 12 pages, describes the Joy Microdyne inertial type wet dust collector. The bulletin contains performance curves, specifications, and a description of a related filter for reclaimation or removal of the collected slurry. *Joy Mfg. Co.*

Cemented Carbide 28

Catalog 59, 50 pages, covers a line of cemented carbide products. It includes data and illustrations on Kendex tools and boring bars, standard blanks, brazed tools, clamped inserts and Kennamills. *Kennametal, Inc.*

Displacement Pump 29

The Pesco Variable Displacement Internal-External Pump (VIEP) is described in a four page folder. Suggested applications for aircraft, commercial and industrial equipment are included. *Pesco Products Div., Borg-Warner Corp.*

Power Presses 30

A 20 page bulletin, Warco 52151, illustrates and describes types of Warco power presses. The paper includes fundamentals of press working of metals with sketches, tables, charts, and other pertinent data. It assists the user in selecting the type of press most appropriate for his work. *The Federal Machine and Welder Co.*

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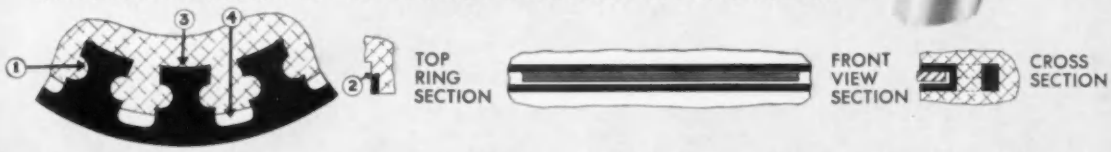

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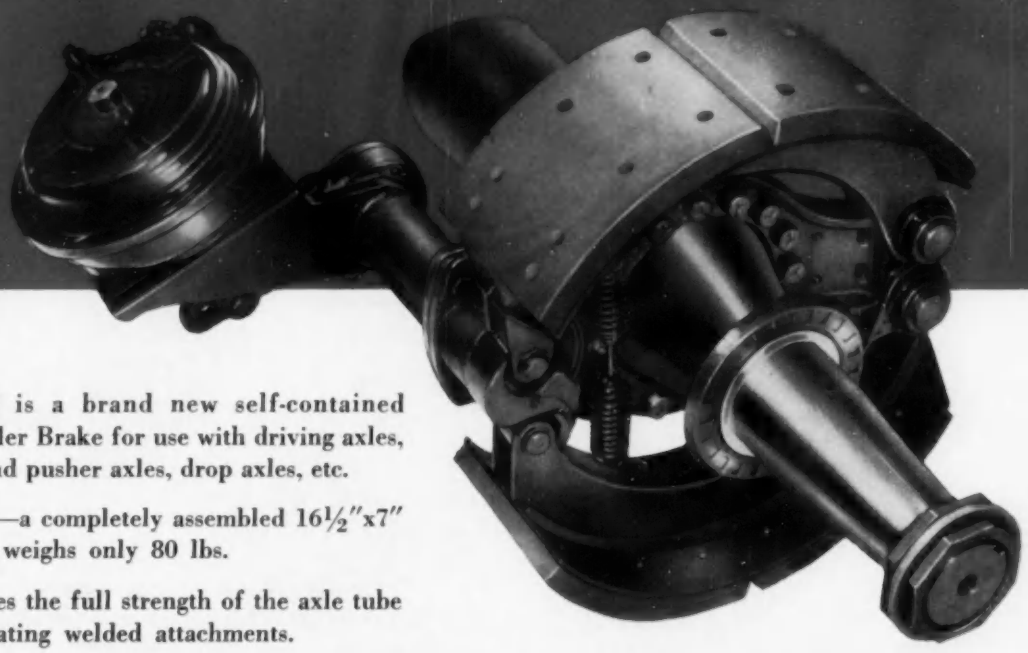

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